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121

Collection and Field Note Book

No. 48

(Nov. 18, 1956 - August 5, 1957)

(38663 -- 38813)

Page

Train trip Washington-New York 11/18 1-19
(DC, Maryland, Delaware, New Jersey)

VIRGINIA (Fairfax County)

btwn Herndon-Sunset Hills...38663-3866420-21
s. of Centerville 26-27
n. of Oscoquan Creed38665-38666 ... 28-31
n. of Bull Run 30-33
n.w. of Great Falls 38667-38670 ... 32-33
below Great Falls 26871 34-35
" " " Pot. River..38672-38676 ... 36-39
s. Springfield 38697-38703 ... 50-53
e. of Annandale 38704 52-53
Great Falls..... 38705-3872464-67
Sleepy Hollow 3872566-67

Trip by auto-Falls Church-High Knob 72-73
High Knob (Norton,Wise Co.) 38730-38732 72-73

Shenandoah National Park

Dickey Ridge114-115
Compton Mountain.....38795-38797...116-117
.....114-115

Train trip Washington-New York 12/26 22-24

LOUISIANA

Fort Macomb,Chef Menteur, New Orleans
.....38677 40-41
e. of Rigollettes Bridge,
St. Tammany Parish 38678 42-43
e. of Slidell,
St. Tammany Parish38679-38687 ... 42-45
Indian Village, St. Tamm.....38688-38689 ... 46-47
Pearl River Village" " 38690-38695 ... 46-49
near Slidell 38696 48-49
Lake Ponchartrain..... 48-49
Air trip Washington-NY..... 54

F R Foshen
Air trip New York-Montreal..... 55
CANADA

Montreal (Quebec), Mount Royal 56-57
Oka..... 58-62

CONNECTICUT

Hemlock Ridge(Litchfield Co.)..38726-38728...68-69
Dolbia Hill(Middlesex Co.)....38729 70-71

KENTUCKY

Cumberland Nat. Forest 38733-38734..74-75
Mammoth Cave 38735-38737..76-79

MISSOURI

w. of Mansfield..... 38738 80-81
e. of Seneca 38339 80-81

OKLAHOMA

Osage Hills State Park 38740-38742..80-81
Trip Elsinore,Mo.-Osage Hills, Okla..... 82-83
Trip Osage Hills,Okla-Buffalo, Okla..... 84-86
Trip Buffalo, Okla.-Capulin Mt.NM..... 87
e. of Jet 38742 88-89
Buffalo 38744-38763 88-91

NEW MEXICO

Capulin Mt..... 38764-38767..87, 92-93

ARIZONA

Trip Taos-Painted Desert..... 94-95
Trip Painted Desert-Grand Canyon..... 96-99
Petrified Forest.....38768 96-97
s. of Little Colorado River...38769-38770.104-105

UTAH

Trip Grand Canyon-Zion Canyon..... 100-108
Zion Canyon 38771-38772.104-105
St. George..... 38773-38778.103,104-107
.....108-109

NEVADA

Rock Creek 38789-38793.108-111

CALIFORNIA

Sonora Pass..... 38794112-113
s. of San Francisco112-113

D.C. - birds on Capitol dome 118-119

MARYLAND (Montgomery County)

Sugar Loaf Mountain..... 120-121

Air trip Washington-Idlewild,NY over
Annapolis, Maryland, N. Jersey, Del.... 122-123

(SEE NEXT PAGE)

No. 48

PUERTO RICO

Air trip NY to San Juan, Puerto Rico	124-125
San Juan airport	125

BRAZIL

Belem	126-127
Air trip Belem-Santarem-Manaos	128-136
edge of airstrip	38798 136
n. of Manaos	38799-38801 142-145
Air trip Manaos-Santarem	146-155
Boat trip Santarem-Maycuru	155
Maycuru	155-158

Para

Belterra	38802-38806 158-159
.....	174-175

Santarem-Belterra	159
Pindobal	160
Air trip-Belterra-Belem	161-171
Uriboca	38805-38806 174-175
.....	172-173
Air trip Belem-Santarem-Manaos	174-182
Santarem	38807-38813 182-183

AMAZONAS

Manaos	183
Air trip Manaos-Taffe	184-197
Acre (from air)	197

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Nov. 18 - Trip by rail
from Washington to New York.
Description of vegetation
from left side windows
of train (Pennsylvania R.R.)
(Coastal Plain landscape)
Leaving Washington -
weedy embankments
and waste places
some dominated by
blankets of *Lonicera japonica*,
others by stands of
Andropogon virginicus
and *A. scoparius*, still
others by mixed
perennial pioneer species
e.g. *Solidago*, *Parthenocissus*,
Aster etc.

Deciduous thickets
with *Acer rubrum*,
Liquidambar, *Quercus*
spp. etc. rarely a few
Pinus virginiana
more and more
common. *Acer* is
especially common
in low spots. *Lonicera*
is very conspicuous
climbing in trees.

Outside Washington
the country becomes
generally wooded
except where occupied
by housing developments.

Woods are predominantly oak, with *Platanus* and *Acer rubrum* in low places. Admixture of pine, mainly *P. virginiana* but some *P. rigida*, are common. Some patches of pure stands of pines. Leaves mostly off the deciduous trees at this time, but a few trees still show some color, some have brown leaves, especially oaks.

Seabrook Sta.

Large sort of mixture, with less housing.

Glenn Dale Sta.

Beyond here are more pure stands of pine, then mixed deciduous woods, largely young second growth, but occasional patches are fairly large.

Bowie Sta.

Much very young second growth, mostly *Quercus*, some stands of pine, 4-8 m tall.

This country is a

occasional low spots of

1956 Md

Woods are predominantly oak, with Platanus and Acer rubrum in low places. Admixture of pine, mainly virginiana but some P. rigida are common. Some patches of pure stands of Pinus. Leaves mostly off the deciduous trees at this time, but a few trees still show some color. Some have brown leaves, especially oaks.

Seabrook Sta.

Large sort of mixture with less housing.

Glenn Dale Sta.

Beyond here are more pure stands of pine, then mixed deciduous woods, largely young, second growth, but occasional patches are fairly large. Bowie Sta.

Much very young second growth, mostly Quercus. Some stands of pine, 4-8 m tall.

ABOUT OUR PEACHES

These peaches are grown on our farm in Fairfax County and are picked the morning of the day you buy them. By picking daily we are able to bring them to you at the peak of their freshness and goodness. Only a tree-ripened peach has these qualities.

The orchard we are picking from this year has eleven varieties, with ripening dates ranging from July to September.

The varieties were chosen because of their high quality for eating fresh. Most of them are also suitable for freezing or canning. You will notice that the Elberta is missing from the list below, but its absence is intentional. The Elberta (often mispronounced Alberta) is an old variety good for canning but definitely inferior for eating fresh or freezing. It is still a popular commercial peach because it ships well and can be handled roughly. But it is not "luscious", as store ads frequently describe it.

Incidentally, we also grow several varieties of Oriental plums -- Satsuma, Methley, Abundance, and Santa Rosa -- which will be available at this stand at times during the summer. All will be sweet and juicy -- again, as in the case of peaches, because they will be left on the tree until ripe.

Following is a list of the varieties of peaches to be sold at this stand throughout the summer. Approximate ripening date is given for each variety. These dates may vary a few days either way, depending on the weather. Each variety is in for about a week after its ripening date.

Variety	Approx. Ripening Date
Early-Red-Pre	July 9
Gold Ray	July 9
Redhaven	July 20
Triogen	July 29
Halehaven	Aug. 7
Georgia Belle	Aug. 13
Summercrest	Aug. 16
Brilliant	Aug. 17
Shippers Red	Aug. 20
Afterglow	Sept. 1
Rio Oso Gem	Sept. 6

Woods are predominantly oak, with *Platanus* and *Acer rubrum* in low places. Admixture of pine, mainly *P. virginiana* but some *P. rigida*, are common. Some patches of pure stands of *Pinus*. Leaves mostly off the deciduous trees at this time, but a few trees still show some color, some have brown leaves, especially oaks.

Seabrook Sta.

Large sort of mixture, with less housing.

Glenn Dale Sta.

Beyond here are more pure stands of pine, then mixed deciduous woods, largely young second growth, but occasional patches are fairly large.

Bowie Sta.

Much very young second growth, mostly *Quercus*, some stands of pine, 4-8 m. tall.

This country is a patchwork of second growth - old field successions - in various stages of development, some pure pine, mostly mixed deciduous.

A large patch of swamp forest several miles from Bowie, then several more, with *Betula nigra*, as well as *Acer rubrum* and oaks. Some places, where the construction of railroad or roads have poisoned the water, show forests partly dead. *Betula* may be identified by pink bark, very scaly, and darker, smaller branches.

After this some rather good pine forests of medium low stature. On rolling hills a mosaic of pine patches and well developed deciduous forest, occasional cultivated patches, occasional low shots of

swamp or bottom-land forest.

after some miles of this open land, either cultivated or grassy becomes more predominant, but still with considerable forest, some park-like landscape. Open land is mostly dominated by *Andropogon virginicus*.

A thicket of *Arundinaria* bet. m.p. 107 & 106.

The country then becomes more generally wooded. *Liriodendron* is very common, also *Platanus* in low places.

Calvert Distillery

Much housing, with some deciduous woods, this becoming less as Baltimore is approached.

In large cemetery trees are largely native deciduous ones, shrubs are mostly planted.

Gwynn Sta.

Entrance to Baltimore has little vegetation except weedy ruderal sites with *Solidago*, *Panicum*, *Eupatorium*, *Aster*, *Rudens*, etc. Scattered tree seedlings of *Ulmus*, *Prunus*, *Platanus*, ~~etc.~~ *Ailanthus*, etc.

Leaving Baltimore weedy vacant lots and ruderal spots. Some marshy, very polluted places, dominated by *Panicum virgatum*. Then some cultivated fields mixed with low patches of deciduous second growth.

A narrow estuarine marsh (more extensive on right side). Then a mosaic of cultivated fields with smaller patches of broad-leaved woods of various heights. Some of these are blanketed by *Lonicera japonica*.

Glenn Martin Plant (on it.)

Woods become more dominant, mostly well grown second growth deciduous, but

with more and more
pine admixed, both
P. rigida and *P. virginiana*
Bengies Sta.

Continues the same,
with some farms
and patches of young
second growth. Some
areas of *Andropogon* near
Chase Sta.

Then some well
developed oak forest,
followed by a mosaic
of younger second growth,
housing, etc.

Then a large estuary
lined by irregular
lobed areas of marsh,
probably largely *Panicum*
virgatum but too
far away to be sure.
Low gravelly ~~bottoms~~
with scrubby second
growth, patches of
good deciduous woods,
very few pines. Some
farms.

Quercus phellos fairly
common with various
other oaks.

Edgewood Sta.

Same sort of mosaic,
on flatter ground. Where

it is at all rolling
pine becomes more
prominent for a
short distance, then
almost drops out.

Another large
estuary, with very
little marsh, higher
wooded shore, but
mostly solidly lined
with houses, ^{small} *Piers*, etc.

Uneven deciduous
woods, oak with
some red maple, especially
in low places.

Then some large
cultivated areas with
patches of deciduous
wood, many houses
surrounded by trees,
almost flat. Much
Conium japonica especially
in margins of wood
and in hedgerows.

More or less like this
to Aberdeen. Fields
tend to be separated
by hedge-rows and
lanes with scrubby
trees, juniper, *Forisieria*.

Young second-growth
becomes more abundant
especially small
thickets.

Slopes around
Horse-de-Grace are
covered by thin scrubby
second-growth, this
being *Lusquehanna* R.
when not occupied by
houses. Small bits
of *Panicum virgatum*
marsh. Island in
river covered by bottom-
land forest.

Beyond Pringville

patches of deciduous
wood in farm-land.
A long hedge of *Myrica*?
cuts off view for a
mile or so. Gravelly
hills are mostly
wooded, largely oak
and *Liriodendron* with
Platanus prominent in
ravines.

Cut banks along
rail road revegetated
in place by a solid
stand of pines (*P. virginiana*).

From here an irregular
mosaic of patches of
clearing in deciduous
woods, locally mixed
with pine, occasional
small swamps and
wet places with
Betula nigra. Openings

dominated by *Andropogon*
virginicus.
Some larger cultivated
farms.

A mixed shrub layer
becomes more frequent
in the woods. And
patches of *Betula*
nigra on apparently
dry ground are
occasional, a few
patches of pine, either
pure or mixed with
deciduous trees. Pines
are mostly *P. virginiana*,
some *P. rigida*.

Around m.p. 46 are
large open areas, either
covered by *Andropogon*
or cultivated.

Elkton Sta.

Deciduous woods
along streams. In
escarpments and
then a large area on
a low hill. Mostly oak.
Open ground cultivated
or in *Andropogon*.

Mostly open. *Larrea*,
probably *Rhus copallina*,
common in waste spots,
with mixture of
Solidago, *Andropogon*, etc.
Newark, Del.

Rolling land, mostly open fields, some patches of deciduous wood, *Quercus* *serotina*, some *Acer rubrum*.

Patches of well-grown deciduous woods with an understory of small oaks.

Some abandoned, apparently frequently flooded land with scattered trees in grass, the ^{small} first plantation near m. p. 32, then a small estuarine marsh.

Housing dominant but not excessive around Newport.

Patches of deciduous woods and large fields of *Andropogon*.

Housing, estuarine marshes, city dump, etc. as Wilmington is approached.

In outskirts a small *Phragmites* marsh.

City has few trees, but some *Ailanthus* to be seen near railroad.

Large London Plane trees around cemetery just beyond station.

Ailanthus in alleys, etc. In edge of city, an area of dump is being revegetated.

Terribly second growth and small patches of estuarine marsh - some with *Typha*, some *Hibiscus moscheutos*, etc.

Beyond this, rolling slopes running down to Delaware river - largely browsing, some deciduous second growth.

Bellefonte etc.

Housing with patches of deciduous woods, very irregular and poor, estuarine marsh, and *Andropogon*.

Woods are oak, red maple, *Platanus*, *Liquidambar*, etc.

Just before Claymont Steel Plant at Nagamans, *Miscanthus sinensis* has quite a foothold.

Then weedy area being repopulated with tree seedlings, these 1 m. tall.

Marion Park area largely housing and factories but with patches of marsh, wood,

etc. Housing more and more dominates landscape into Chester.

Between Chester and Philadelphia housing areas largely dominant but many with good growth of trees.

Occasional nice patches of deciduous wood especially on rough ground. Waste spots and cut banks very weedy.

Rumex japonicus quite common. Some patches of basswood saplings, also *Rumex* and *Achillea*. *Chenopodium*, *Rubus*, *Setaria*, *Solidago*, *Panicum*, *Andropogon*.

Just before ^{Convent Station} 75th St. etc. is Woodland Cemetery with many fine old trees.

Little vegetation except weedy banks and *Achillea* trees between 75th St. and North Philadelphia. Some London Plane trees just before North Philadelphia. After North Philadelphia, for some distance an industrial area with little except ruderal vegetation.

After Frankford there is a change to a largely residential area, with more trees, but still very little vegetation. Some patches of sparse second-growth brush. Still mostly housing and industry to Holmesburg Jct. Then still more industry but many patches of young second-growth wood ~~also~~ with *Liquidambar*, oaks, etc. in low spots. Some *Liriodendron* - oaks, etc. on higher ground. *Platanus* abundant along stream and ravines.

More open fields, scattered trees, especially along roads and around houses. Cultivation and *Andropogon*. Small marshy spots surrounded by trees.

Young second-growth, especially *Liquidambar*, *Sassafras*, etc. before Croydon Sta.

Mosaic of this, cultivated field, etc. between here and

Very irregular mixed deciduous woods, much logged out in past, but with some large trees, areas of swamp.

Then large open area with *Andropogon* and industrial plants near Plainfield.

Farms, Liquidambar-oaks - *Betula nigra* woods, some red maple, some bushy swamp with patches of marsh.

Liquidambar the most common tree. Tangles of similar.

More and more farmland till ~~before~~ Midway mostly open, then more of the same mosaic but with little or no farmland. *Betula populifolia* and *Fraxinus*, as well as *Liriodendron* common on high spots.

Some patches of *Andropogon*. Low wooded country to Johnson & Johnson plants which are in large open area. Then very sparse old field woods.

growth in *Andropogon*. Some housing.

Then a mosaic of open fields and patches of woods, all deciduous.

Industrial area before New Brunswick rather open, with some thickets.

After the town an area of river-bottom wood, rather sparse. Then broken patches of thick deciduous woods, housing, fields, factories, etc. to Edison.

Then a large area of low deciduous wood, Liquidambar, oaks, *Acer rubrum*. This gives way to sparsely grown up old fields and patches of *Andropogon*, then farms and patches of housing in Ketchikan (?)

Then Liquidambar - *Acer rubrum* woods, rather young and irregular.

Mentis Park Sta.

Patches of housing & woods. Eselin Sta.

Housing scattered in woods. Some *Andropogon*.

and a golf course.
Soil in this region
is deep brown to red.
Housing more and
more replaces wood
to Rahway, which
has many trees,
mostly native ones
as far as can be seen.
Considerable industry
with housing and
some deciduous
second-growth wood
Linden etc.

Thickly populated
but still many trees.
Housing becomes denser
and trees less into
Elizabeth. But Elizabeth
generally has fair
number of trees - oaks,
Linden, plane, maple, etc.
Industry increases
rapidly, as does general
density, into Newark.
Little except industrial
patches here, occasional
Ailanthus.

Leaving Newark a dense
industrial area gives
way abruptly to Phragmites
communities marshes,
in places being filled
in with city waste.

Large areas of Phragmites
extend to the first
basalt intrusion just
beyond a large tidal
river in the outskirts
of Jersey City.

The basalt hill is
covered by Andropogon
and a sparse growth
of stunted oaks.
Then more Phragmites
between here and the
entrance to the tunnel.

The Phragmites is
dense, cause a few
cm. apart, 1-2 m. tall.
Partly with old
inflorescences.

Dec. 22 - between Herndon
and Sunset Hills

low swampy open
woods, mostly oaks and
red maple

38603 *Lycopodium obscurum*
abundant

64 *Lycopodium complanatum* L.
~~aff. *obscurum*~~
common but more so
on slightly higher ground

Herndon

rhizomes buried,
shoots erect, leaves
somewhat compressed
into subdistichous ^{med.} arrange-
ment - extensively creeping
rhizome buried in loose
litter.

Dec. 26 - Trip by rail from Washington toward New York, Pennsylvania R.R., right side windows of train

Waste spots along track, with dry grass, especially *Andropogon virginicus*. Patches of trees, especially clumps of *Ailanthus*, some oaks, red maple,

National Arboretum with low hills covered by deciduous woods in distance. Beyond this broken woods, grass and marsh, swamps forest in Anacostia River bottom land.

Liquidambar, oaks, elm(?) and red maple with *Pinus*, mostly *P. virginiana* scattered and locally in patches - low spots with standing water lack pines.

A few old fields on rolling ground growing up to brush, mostly *Pinus virginiana*.

Banks along tracks largely covered by *Lonicera japonica* - dull purplish green.

Pines become more and more abundant, in places dominating landscape. Banks here mostly covered by pine seedlings and saplings.

A few farms and housing development, but country along track mostly wooded.

Bowie -

Deciduous woods more and more common, pines scattered except where concentrated in old fields.

Betula nigra, with pinkish trunks, especially in low spots.

Soil very sandy.

Liriodendron common in most sites except lowest. *Fagus sylvatica* but very local.

Pines become very abundant in broken landscape of well grown old fields. Mostly *P. virginiana* but considerable *P. rigida*.

Country very flat. Locally many small ponds.

Then open gently
 rolling land with
 Andropogon, scattered
 small oaks and pines.
 locally gregarious
 and forming thickets.
 Large factory a little
 distance from track.
 Then bushy swamps
 and rolling thinly
 wooded land, some
 areas of small deciduous
 woods, scattered pines.
 Ponds and low woods
 across from Calvert Distillers
 Houses abundant but
 with many trees.
 Some badly cut up
 excavated ground with
 patches of wood.
 High banks - then
 a General Electric plant
 and other factories
 and much housing.
 Some small patches
 of deciduous woods
 also ~~some~~ dumps. Housing
 merges into city of
 Baltimore.

Jan. 1 south of
Centerville east of
Bull Run

cutover second-growth
deciduous woods
with scattered patches
of scrub pine.

Flat to gently rolling
ground trees to 20 cm. dbh

- c *Quercus velutina*
- c *Carya* spp.
- c *Quercus alba*
- la c *Cornus florida*
- o *Viburnum* sp.
- o *Vitis* sp.
- o *Fagus grandifolia* (very small)
- lc a *Juniperus virginiana*
- ~ *Percis canadensis*
- lc ~ *Iracinus americana*
- ~ *Prunus americana*
- la *Pinus virginiana*
- lc *Rhus copallina*
- ~ *Ilex rubrum*
- ~ *Quercus stellata*
- 2 *Prunus serotina*
- sl. *Liriodendron*

Density of large trees
varies from
rather open to very open.

~~usually~~ saplings
layer dense to open.
Pinus virginiana saplings
quite common locally
abundant.

Saplings mostly oak,
cypress, a few of ^{each of} most of other
species listed.

Generally but not always
the more open the situation
the commoner the pine
saplings. They are
conspicuous all along the
road. Some patches
of *Pinus strobus*
especially along road
but not very common.

~~Size~~ Maximum size of
trees increases toward
Bull Run, some may
exceed 30 cm. near the
escarpment though
not many reach such
a size.

Stumps of various
ages are common in
the woods, but none
very recent. Obviously
logging has, in the
past, been rather
severe.

Several exposures
of "trap rock" here.

Jan. 1 north of Occoquan
reach, w. of mouth of Sandy Run.
s.e. of Farris Corner

300-7 ft

Thick wood of
inodendron, oak, etc.
on dissected ground.
trees mostly 20 cm. or
less. Some pines, locally
abundant.

Patches of *Kalmia* in
undergrowth. small
patches of *Epigaea*

Young *Fagus* very
common but no old

trees seen on beginning of ridge.

One *Tsuga* tree 15+ ft high
on knoll in a concentration
of pines. Scattered small
Ilex opaca. Some *Ad. rubrum*.

Stump seen but all
very old.

In a distance beech
become locally abundant.
Here scattered small
hemlock.

Above ~~Occoquan~~ a large
patch of *Rhododendron maximum*
up to 2 m. tall

This forest is
suggestive of a more
favorable habitat than
that in the Bull Run
area. The soil here is
either coastal plain
alluvium or deeply
weathered schist.

Some quartz fragments
seen. Depth, as indicated
by erosion pattern, is
much greater.

A road runs in,
following a sinuous
ridge. This has been
newly bull-dozed but
may be an old road.

1957 Virginia
north sideJan. 1 - Occoquan Creek above
Ryan Dam, west of Stillwell Cr.in mixed woods at top
of escarpment overlooking creek

38669

Tsuga canadensis

common, mostly small trees.

2

66

Rhododendron maximum

small colony

Jan. 13 - 2 mi. n. of Bull Run

Second growth deciduous
forest with scattered
Juniperus and a few
small pines.Trees mostly sapling
and pole size, a few 20 cm.
d.b.h. and a very few
old wolf trees 30-50 cm.Much of this is open
enough for pine seedling.
Probably was pastured
rather heavily, possibly
for some time after the
forest started to come back.Mosaic of patches
of varying ages possibly
reflecting fire history
as well as that of land use.Small openings in
woods. Patches of moss
and lichens may
be result of small
ground fires.

60 cm.

Fairfax Co.

small tree, 9 m. tall

shrubs 3 m. tall

A few patches of pine also
patches of rather good
forest. *Juniperus* varies
a good bit in abundance.Deciduous trees are mostly
oaks of various kinds.*Prunus serotina*, *Carya* spp.
Most of largest trees are
Quercus alba.Some small *Q. coccinea*.Wolf trees common
in parts, absent elsewhere.
No. Taxus seen.

Feb. 10 - north-west of

Great Falls, Tampa Co.

- 38667 *Dryopteris austriaca*
in thick woods, mostly
Liriodendron

March 7 - Benedict Channel Co.

Patuxent River, Estuary

- 68 *Phragmites communis* -
dense stand in marsh

March 7 - Battle Creek Cypress
Swamp, Calvert Co. Md.

- 69 *Taxodium distichum*
dominant tree in
swamp forest
- 70 *Campsis radicans*
common at edges of swamp

50 m.

fronds green, mostly
almost prostrate.

1 m.

canes 1.5 m. to

3 m.

tree 1 m. tall leafless at
this season, clusters of
buds pendent
woody vine climbing
in bushes, leafless at this
season.

March 10 - area below
Great Tree

Elms and red maples
in bloom.

This area marked
"meadow" on a map of
the William Fairfax plat
in 1739 (Aug. 11 by John Warner
filed at Richmond. The
record of this survey, by
Jn. Warner, lists numerous
witness trees. In order of
abundance: (dated Aug. 17, 1739)

White oaks (falls under be.
red oaks copy)

black oak

Spanish oak

Water oak

pine oak

Water live oak

Chestnut oak

Chestnut

Birch

There are at least two
elms in bloom - the one
with very corky bark
and one with more platy
bark, probably *Ulmus americana*.
None smaller than 15' have
any flowers, scarcely
any smaller than 25-30'.

36871

Ulmus

common on rocky flat

50 m.

Plants seen in identifiable
condition:

Dryopteris marginalis

Asplenium trichomanes

Asplenium platyneuron

Polypodium vulgare

Botrychium dissectum

Delphinella rupestris

Pinus virginiana

Juniperus virginiana

Hepatica americana (fl.)

Claytonia virginica (fl.)

Celtis occidentalis

Platanus occidentalis

Acer rubrum

Acer negundo

Lindera benzoin

Lonicera japonica

Ludwigia alternifolia

Lespedeza virginica

tree 20 m. tall (fallen twig)
bark corky ridged.

March 17 - Potomac River
just below Great Falls
Wooded river flats

38672

4

Ulmus thomasi?

common in deciduous woods

Plants seen in flower
in flats -

*Ulmus thomasi**Ulmus americana**Chaptalia virginica**Pentstemon lanceolatus**Veronica**Arabis**Hamamelis virginica* (bud)*Acer rubrum**Asimina triloba* (bud)*Vincetoxicum*

2

73 *Asimina triloba*

occasional, local

4

74 *Arabis lyrata*

common along paths

1

75 *Veronica*abundant on banks and
along paths

50 m.

small tree, bark with
corky ridges. (They seem
much larger, 5-20 m. tall
and 1 dm. dbh.)

shrub 3-4 m. tall,
bark dark brown
flowers white

flowers lavender.

April 13 ^{below} Great Falls

Claytonia very abundantly
flowering. also in flower
Muscari

Dentaria laevis

Dicentra cucullaria

Arabis laevigata

Arabis lyrata

Lindera benzoin

Barbarea vulgaris

Lamium amplexicaule

Veronica sp.

Phlox divaricata

Flechma hederacea

Ranunculus abortivus

Cardamine (large fl.)

Stellaria media

Viola papilionacea

Mertensia virginica

Vinca minor

Stellaria pubera

Saxifraga virginica

Hedysotis caerulea

Heptatica virginica

Corydalis aurea

Euphorbia peplos

Fragaria virginiana

Podophyllum peltatum

Dentaria diphylla

Erythronium americanum

Phlox subulata

Isabris hibernica

38670 Ulmus

common on flood plain

Taraxacum vulgare

Alliaria

Trillium sessile

Cercis canadensis

Cornus canadensis (buds red long)

Lyola (grayish leaf)

Lagotis serpyllifolia

Draba verna

50 m. (same tree as 38671, 38672)

April 3 Fort Macomb
Chef Manteur

Extensive marshes dominated by *Phragmites communis*, locally by *Baccharis* and *Typha* but these badly affected by drainage ditching.

Last year's *Phragmites* culms 3-4 m. tall, dry, fruiting, bare or covered by sheaths from which blades have fallen, young leafy culms to 1 m. tall.

Salinity of marsh water said to be 6-7‰ of sea water.

Best references - Penfound, W. & Hathaway, E.S., Plant Communities in the marshlands of Southeastern Louisiana. Ecot. Monogr. 3:1-56, 1937 and O'Neill, T., The muskrat in the Louisiana coastal marshes. La. Dept. Fisheries, 1949.

Phragmites communis
dominant in marsh

A common vegetation type in these marshes but not seen in good development is termed locally "chenier" an area slightly higher than the marsh, covered by small oaks, mainly

Artificial higher ground around ruins of fort covered by thicket of *Celtis mississippiensis* with some *Gleditsia pumila*, *Zanthoxylum*, and dense undergrowth of *Pteris caudata* and *Melissis aziderach*, both flowering. Trees have abundant *Tillandsia usneoides*, *Lonicera japonica* occasional, flowering. In moat of fort are floating mats of *Alternanthera philoxeroides* (introd. from Tropical America, reproduces vegetatively only). Around thicket is *Smilax bona-nox*, abundant *Allium tricoccum* producing flowers and bulblets, *Scutellaria* and other herbs.

Old cane 3-4 m. tall, bare new cane to 1 m., leafy.

Quercus virginiana, with other woody species. Slightly higher ground still is likely to have larger oaks and pines but is not called "chenier".

1957 Louisiana

April 3 - 1-2 mi. east of
Rigobettes Bridge.

Low wet but solid
ground, with abundant
herbaceous flora and
widely spaced *Pinus*
taeda, *Quercus virginiana*,
Q. stellata, etc. Swamp
with *Tillandsia usneoides*.

38678 *Hedyotis caerulea* var. *minor*
rare along very slightly
higher ground near pen.

April 3 - same but to
east and toward Pearl River.

Denser pine-oak woods
on flat ground, with
Pinus taeda, *Quercus*
virginiana, *Q. stellata*.

April 3 - 7 mi. e. of Slidell,
so of Pearl River.

Swamp, dominated by
Nyssa biflora, with some
Quercus nigra, *Ilex*
racemosa var. *drummondii*
and a little *Magnolia*
virginiana in standing
water. On the edges, on
wet silty soil, are *Liquidambar*,
Quercus phellos, *Quercus virginiana*.

St. Tammany Parish.

The open character here
seems to be due to fire.
Common genera here - *Panicum*,
Limbristylis, *Juncus*, *Tradescantia*,
Krigia, *Baptisia*, *Nothoscordum*,
Scutellaria, *Hedyotis*, *Plantago*,
Trachium, etc.

flowers lavender with
reddish centers.

Q. nigra, *Q. falcata*,
Liquidambar, *Nyssa biflora*,
shrubs, as *Ilex vomitoria*,
Myrica cerifera, *Ilex opaca*,
Lymnocyba, some *Smilax*.
The oaks have much more
Tillandsia than do the pines.

Myrica cerifera, *Crataegus* sp.,
as well as the trees seen
to the west (above). This
forest is scarcely definitely
layered. *Polypodium*
polypodioides and *Tillandsia*
are epiphytes. *Smilax*
laurifolia and *S. bonariensis*
are not abundant. The
large trees have been
cut, leaving stumps.

The swamp trees, especially *Nyssa*, have swollen bases. Very little *Taxodium* seen. Spacing of trees in swamp 1-3 m. General height is about 25 m.

Mixed swamp and slightly higher ground

38679 *Acer rubrum* var. *drummondii* common in

80 *Irosera brevifolia* Pursh ? common on open wet soil

81 *Hedyotis coccinea* var. *minor* very rare on ^{open} wet soil.

82 *Symplocos tinctoria* (L.) L. f. rare on moist slightly higher ground in woods.

83 *Crinia* common in wet ground

84 *Hedyotis uniflora* (L.) rare on open wet ground

85 *Elatine americana* (Pursh) Arn. ? common on open wet ground

86 *Hieracium brownii* Small occasional in open wet ground.

87 *Centella repanda* occasional in open wet ground.

some open ground, disturbed, with herb pioneers, in moist sandy-silty soil.

small trees 3-4 m. tall (others seen taller), all seen have pubescent leaves, plant reddish, corolla white.

slender tree 5 m. tall flowers cream, old leaves reddish.

flowers yellowish,

depressed.

flowers yellow marked with black inside, segments ~~curved~~ ^{concave} base of flower uncolored.

rhizome prostrate, creeping, buried; leaves erect with blades vertical; sterile.

April 3 - Indian Village,
Pearl River, 10 mi. east
of Slidell

Swamp with *Nyssa*
biflora, *Nyssa aquatica*,
Quercus nigra and
Taxodium, heavily
covered by *Tillandsia*

- 39698 *Polypodium polypodioides*
abundant on trunks
and limbs of giant live-oaks.

April 3 - Slidell

- Open pine-land on clay
soil with *Andropogon*, etc.
89 *Larrea sedgei* Macf.
occasional in

April 3 - Pearl River Village,
on branch of Pearl River.

Swamp of *Nyssa biflora* etc.
mixed with higher ground
with Pine-oak-beech forest
and thickets on clay soil.

- 90 *Illicium floridanum* Ellis
local in low ground, ~~swamp~~
edge of swamp
91 *Asarum*
common locally on low ground.
92 *Vaccinium*
rare on slope

It is abundant in
open spots. *Polypodium*
polypodioides abundant
on trees on higher ground.

rhizome creeping, clinging
tightly to bark.

petals pendent, lemon
yellow.

Quercus nigra, *Q. virginiana*,
Q. alba (southern limit), *Acer*
saccharinum var. *drummondii*,
Fagus grandifolia, *Pinus*
taeda, *P. glabra*. *Myrica*
cerifera is very common.

shrub with strong odor,
flowers deep red.

flowers unisexual, fleshy,
greenish pink.

— Shrub 1 m. tall, flowers
white, pendent, leaves
glaucous beneath.

- 38693 *Fagus grandifolia*
common locally on slopes
~~to~~ above swampy level.
- 94 *Pinus glabra*
common on slopes and flat
ground above swampy level.
- 95 *Slicium floridanum* Ellis
local on low ground near swamp

April 3 near Slidell,
east of Covington
"Acid bogs" open flat land
covered by *Andropogon*,
sandy clay soil; surface
layers somewhat darkened.

April 7 - Edge of Lake Ponchartraine
s.w. of Slidell. end of causeway.
Narrow strip of marsh
between lake and pine-oak
forest. Between road and
railroad is extensive
marsh.

- 96 *Amorpha fruticosa*
common at edge of marsh
on drier ground.

Apr. 7 - Lake Ponchartraine, n.e. of
Gentilly, New Orleans
Remains of cypress swamp
trees all dead. Said to have been

tree 10 m. tall, 20 cm. dbh.
leaves young.

^{shrub}
small tree (others seen to
30 m. tall) ~~shrub~~; leaves
irregularly spreading,
(cones from fallen branch of
another tree)
sterile shrub 1 m. tall,
tough, strong smelling
when broken.

Said to quake. *Ilex pedunculata*
is common, young pines
scattered, some *Sphagnum*
along rivulets.

very slight difference
in altitude between
marsh and forest, but
transition quite abrupt.

shrub 2 m. tall; corolla
deep purple, anthers orange.

killed by rise of pH due to
salt water blown in by
hurricane many years ago from
Lake Borgne. Never has recovered.

Apr. May 5 - ~~rather~~ south
of Springfield

rather sparse pine woods
mostly *Pinus virginiana*
& few *P. rigida*.

1-3 dm. dbh, about 20 m. tall,
spaced mostly 2-4 m.

A few *Liriodendron* about
same size, a scattering
of *Nyssa*, *Liriodendron*,
Acer rubrum, etc. from

*Cornus
florida* (?)

5-10 m. tall, a rather
abundant but scattered
shrub layer mostly
1-2 m. of tree seedlings.

*Viburnum
dentatum*

V. pumilum
V. acerifolium

*Vaccinium
corymbosum*

Sassafras, *Acer rubrum*,
Agave, *Liquidambar*,
Quercus phellos,
Vaccinium atrococcum,
Quercus alba.

A more abundant
but still scattered
low shrub layer 3-10 dm.
Vaccinium vacillans,
V. stamineum, *Quercus*
phellos, *Q. alba*, *Fagus*,
Acer rubrum, *Smilax latifolia*,
Q. glauca, *Ilex opaca*.

Ground layer still
scattered. *Chimaphila* etc.

maiculata, *Mitchella*, etc.
Rhus toxicodendron, a
Cypripedium acaule etc.
Ascyrum hyemifolia (L)
P. tentilla simplex (a)

Polystichum acrostichoides (L)

38697 *Vaccinium vacillans*

very common in

3 98 *Vaccinium vacillans*
one plant seen3 99 *Vaccinium atrococcum*
one plant seen38700 *Hedyotis caerulea* var. *caerulea*
very local in2 01 *Isotria verticillata*
very local in4 02 *Cypripedium acaule*
very common locally in1 03 *Viola primulaefolia*
local in moist depression inMay 5 - 1 am. east of
Annandale2 04 *Lonicera*
in pasture fence-rowforming loose clones
up to 3-4 dm tall; flowerspale green
~~small bush~~
4-5 dm tall, flowers
reddish green.

shrub 1.5 m. tall.

flowers pale lavender.

— centers yellow.
lip white, 2 petals pale
green, sepals dark bronze
— purple.— lip rose purple, marked
in front with white;
petals and sepals dark
brownish red.
— flowers white.shrub 1.5 m. tall, flowers
white.

May 11 - Air trip Washington to N. Y.

South of Washington - Baltimore Parkway in vicinity of Greenbelt are areas where the angular pattern of pine forest in a matrix of bright green broad-leaf forest ~~is~~ shows up extremely well. Outlines of old fields, roads, etc. are very clear. Some of the deciduous forest is variously mixed with pine.

For some distance south of Baltimore the landscape is incredibly butchered. Highways and real-estate "developments" dominate the scene, even obscuring agriculture. Military installations along the bay cover enormous areas, and tank farms are prominent and extensive.

extensive bogs & moors, where cultivated the soil is black.

May 11, Air trip from New York to Montreal.

First part of trip cloudy. The country west of the south end of Lake Champlain is flat or rolling agricultural land with scattered monadnock hills, which are generally wooded, about 90% or more deciduous, with patches of conifers.

North of this hills become more numerous and run together as a complex - higher and more mountainous but still predominantly in deciduous woods, some burned areas, some blue-berry barrens?, lakes. Conifers increase northward. Soil very pale buff-gray, some dark mottling but this inconspicuous.

North end of lake on a broad plain with no hills & only very low ones. Agricultural with patches of mostly poor mixed forest, soil here very black with some buff mottling. This extends north to Montreal, with

May - Montreal

n ~~Mount~~ Mount Royal

(a limestone coralline rock)

Degraded beech-maple forest - black-mull soil ^{haleoglyca - large - immature}

- a *Acer nigrum*
- n ~~Fraxinus~~ *Ulmus rubra*?
- c *Filix americana*
- c *Istrya*
- l *Betula papyrifera*
- c *Acer rubrum*
- c-c *Carya cordiformis*
- c *Fraxinus americana*
- l *Populus grandidentata*
- n *Quercus rubra*
- c *Amelanchier* sp.
- c *Corylus cornutus*
- a *Prunus virginiana*
- a *Cornus rotundifolia*
- c *Sambucus racemosa*
- l-c *Caulophyllum thalictroides*
- a *Erythronium americanum*
- c *Tulipum* - and *epilobium*
- c *Adiantum flexuosum*
- c *Calla*
- c *Thalictrum flavum*
- c *Carex*
- l *Dieris* - *sp.*
- n *Languncularia* - *sp.*
- l-c *Proserpinaca* - *sp.*
- l *Olygonatum pubescens*
- n *Actaea*
- l *Rubus odoratus*
- l-c *Viola pennsylvanica*

a very prominent
- 7 m. - undergrowth
of *Acer nigrum* & *Prunus
rotundifolia* + *Prunus virginiana*.
This from a certain amount of
long continued disturbance and
some opening up.

- n *Populus deltoides*
- n *P. tremuloides**

- l *Sambucus racemosa*
- n *Acer negundo*
- ~~*Laportea*~~ *sp.* * (*Prunus tomentosa*)

* this around an overgrown
small opening, probably
a former house site.

- l *Aster cordifolius*
- n *Tulipum sectum*
- l-c *Hydrophyllum virginicum*
- l *Clidodium**
- n *Lanuncula* sp.
- n *Artemisia ludoviciana*
- n *Cirsium quadrifidum*

Large birch colony where
formerly cleared, much as in
U. americana.

May 12 C Ra

Beech maple forest, little altered
almost solid stands
of red maple v.
some

- o *Quercus rubra*
- o *Fraxinus americana*
- o *Tilia americana*
- o *Ulmus americana*
- o *Fagus grandifolia*
- o *Carya ovata*
- o *Carya cordiformis*
- o *Aster*

- o *Sambucus racemosa*
- o *Rumex virginiana*
- o *Aralia nudicaulis*
- o *Amphicarpa bracteata*
- o *Sisyrinchia alba*
- o *Thalictrum flavum*
- o *Trillium grandiflorum*
- o *Urtica dioica*
- o *Lonicera xylosteum*
- o *Vitis rotundifolia*
- o *Smilacina racemosa*
- o *Asarum canadense*
- o *Solidago canadensis*
- o *Campanula medium*
- o *Prunella vulgaris*
- o *Polygonatum pubescens*
- o *Brachyotum erectum*
- o *Erythronium americanum*
- o *Primula*

Dark brown mud soil on
Precambrian Laurentian
rocks but thin silt covered.
A rather thin shrub
layer, mostly red, cooling.

- o *Botrychium virginicum*
- o *Carex* sp.
- o *Solidago flexicaulis*
- o *Picentia canadensis*
- o *Allium lucorum*
- o *Picea*
- o *Carex acutata*
- o *Galium* sp.
- o *Asarum canadense*
- o *Trillium erectum*
- o *Polygonum*

- fruit somewhat pyriform, stamens
yellow

On north slope
 some *Tsuga*, abundant in some
 near *peninsularium*
Dracopis *rostratus*
Adiantum
Ribes c. y. rostratum
Trillium erectum
Asarum canadense
Viola canadensis
Pentstemon lophyllus
Hepatica acutiloba
Maianthemum
Equisetum sarpoides
Carex pedunculata
Mitella diphylla
Thelypoda *disjuncta*
Polystichum acrostichum
Adiantum filix-foemina
Betula lutea
Pinus palustris
Actaea rubra

These species
 added to those
 in the great
 as it is in other
 places.

Patches of pine with

Pteridium, *Vaccinium*, *Gaultheria*
Carex peninsularis, *Kalmia angustifolia*
Antennaria sp.
Eryopodium triflorum
Arabis sp.
Gaylussacia procumbens

On alluvial plain irregular
~~as~~ stands of *Populus*
trémuloides, *P. grandidentata*
 with scattered *Pinus*
strobus (~~*P. strobus*~~) *resinosa*
rubrum *halix* sp.
Quercus alba.

with *Equisetum hyemale*
Lin. typhloides
Gaultheria procumbens
Trillium grandiflorum
Impatiens acrisifolia
Hepatica americana
Vaccinium angustifolium
Arundinella umbellata
Fraxinus virginiana

Open sandy places
Emptenia phragmites
Carex spp.

Quercus rubra has
 some coccinea-like leaves.

Lolida *remota*
Pteridium aquilinum
Arctostaphylos uva-ursi
Danthonia spicata
Vaccinium myrtillus
Amelanchier spp.

Along lake margin
are sand flats with
low Salix spp. dense stand.
A low sand ridge
with oak forest - Quercus
alba, Q. bicolor and Myrica.
Acer rubra, Tilia americana
Alnus crispa
with ~~Rhus glabra~~ *Rhus glabra* *Rhus glabra*
Rhus toxicodendron
Corylus cornuta!

back of this swampy
ground with *Acer*
saccharinum,
a little *Fraxinus nigra*
with *Sparganium angustifolium*
Osmunda cinn.
Willows here in
disturbed places

The *Acer saccharinum*
are dense clusters of
sprouts, appearing
to be from stumps, but
these considered by P. D. to
be natural, not from
cutting.

Higher spots have beech-
maple forest, Trillium etc.

June 1 - Great Falls of the Potomac
Flood plain stream
with large boulders and
rock outcrops.

- 38705 *Onosmodium virginianum* (L.) Jacq.
common in sandy semi-
shaded spots between rocks.
- 06 *Viburnum recognitum* B. & M.
common in undergrowth
- 07 *Viburnum dentatum* L.
common in undergrowth
- 08 *Melica mutica* Walt.
occasional in semi-shade
- 09 *Panicum*
occasional in semi-shade
- 10 *Panicum*
rare in semi-shade
- 11 *Danthonia spicata*
occasional in semi-shade
- 12 *Stipa avenacea* L.
occasional in semi-shade
- 13 *Panicum*
occasional in shade
- 14 *Polygala polygama* Walt.
occasional in semi-shade
- 15 *Euphorbia commutata*
rare on shaded boulders
- 16 *Carex grayi* var. *hispidula* Gray
rare in damp shaded place.
- 17 *Crabapple laevigata* (Muhl.) Poir.
common in semi-shade
- 18 *Racineus caroliniana* Mill. ?
in sparse woods.

90 m.

erect, flowers greenish-white.

shrub 2 m. tall, flowers
white (all seen were
flowering)
shrub 2 m. tall,
fruits immature (all seen
- 1 ad fruit this age).

almost erect

erect

culms ascending

culms ascending,
spikelets drooping.
culms nearly erect.

stems erect flowers

- rose pink
flowers greenish-white.
- capsule angle very obtuse.
very loose small tufts.
- perigynia beaks firm.
slightly glaucous.

slender tree 3 m. tall, sterile;
leaves green beneath.

38719 *Unus?*

rare in woods

20 *Arenaria serpyllifolia* L.

rare in semi shade

21 *Valerianella*

rare in rocky place in woods

22 *Arabis lyrata* L.

common in rocky semi-shaded to shaded places.

23 *Panicum*

common in semi-shaded place

24 *Unus* *Thomasi* Lang?

common in woods

Gonolobus carolinianus
flowering abundantly
in semi-open places at
top of cliffs.

Chrysogonum in flower
Ilex verticillata in bud.
Liparis in flower, very rare.

May 25 - Deeply Hollow
stony roadside

25 *Stellaria graminea*
local colony

slender shrub 2.5 m. tall.

flowers white.

corms ascending.

small tree: same tree
as #38671, 38672, 38676

decumbent, rooting
at nodes, flowers white.

June 16 - Hemlock Ridge,
east side of Lake Candlewood,
north of Danbury

Low ridge formed
of steeply tilted beds of
gneiss, showing
some small quartz
or pegmatite veins.

Crest of ridge open
because of narrow
powerline right-of-way.
Slopes wooded.

Woods apparently
second-growth after
pasturing? or fire?

Largest trees are
very sparsely scattered
Quercus

with *Betula lenta* next
and ~~as~~ probably tending
to dominate, as they are
rather abundant.

Betula populifolia to 10
m tall, being overtopped
by the *B. lenta* and *Quercus*.

38726

spontaneous between stones of terrace
27 *Laguna*

spontaneous between stones of terrace
28 *Corydalis ophiocarpa*
naturalizing locally from
planted specimen, around compost pile.

Juniperus virginiana
common in forest but
clearly suppressed,
except in a narrow
clearing where the
Juniperus is vigorous
and much larger.

Eventual dominance
may probably be by
Carya sp. ^{*hacina americana*} seedlings
or sprouts and saplings
are very common.

Tsuga is common on
top of the ridge, but
trees are small. One to
medium *Quercus* a
10 cm. dbh, a small *Q. coccinea*,
larger *Q. velutina*
Ucer rubrum fairly
common

flowers creamy or
slightly greenish white.

June 17 - vicinity of
Dolbin Hill, east of
Eightmile River, East
Haddam

Large block of wooded
land with almost no
roads. Some areas are
in pasture. Some areas
are *Quercus ilicifolia*
scrub with sumac.
Mainly the uplands
are covered by mixed
oak forest. The ravines
and lowlands along
the river are largely
in hemlocks. Here the
undergrowth is largely
young hemlocks.

This land has largely
been cut over, some of it
recently, some long ago.
Land to be not burned
over much.

Between the Dolbin Hill
farm and Burnham's Brook
is an area of brushy
old field, with *Betula*
populifolia, *Vaccinium*
corumbosum

38729

inodes sensibile

along trail in hemlock-beech
woods, Burnham's Brook

100-

450'

alt.

4579

Hamburg

Quadrangle

Along Burnham's Brook
the forest is a mixture of
Tsuga and sugar maple
with much *Kalmia*
latifolia. *Fagus*, *Betula*
lutea, a little *Acer rubrum*
and *Quercus rubra*

June 27 - trip ~~out~~ ^{by} auto
from Falls Church to
High Knob near Norton
casual observations -

Albizia julibrissin is
freely naturalized out
to well beyond Fairfax.
It is in full bloom
both wild and cultivated,
shows a color variation
from a pale creamy pink
to a deep old-rose. ^{Cult. abundantly in lower Potomac valley.}

Along Thornton River road
just inside Shenandoah
Park gate may be a
stand of *Sorghastrum*
nuttans. Also near the
top of the road, just
below Thornton Gap, may
be single tree of *Picea abies*.

June 27 High Knob, just
south of Norton, Wise Co.
common in oak forest
on gently sloping ground

38730 *Hedysotis purpurea* var. *purpurea*

31 *Luzula*

32 *Thelypteris noveboracensis*
dominant ground cover

I n.s.w. Virginia,
in Clinch Valley and
similar limestone
regions pastures
are frequently thickly
beset by small *Juniperus*
or by small *Crataegus*.
Which is dominant
apparently depends
on seed source.

The Allegheny ridge
and Clinch mountain
are densely wooded.

High Knob has a
well developed oak
forest, with trees to
30 m. tall and up to
40 cm. dbh. In a very
sparse understory (at the
camp ground) is *Amelanchier*
sp., *Nyssa sylvatica*, *Fagus*,
Menziesia, *Rhododendron*.
Considerable *Acer rubrum*.
Conopholis americana, *Monotropa*
uniflora.

small tufts, flowers
very pale lavender.

— small tufts

June 23 - by auto from
High Knob to

Along road from High
Knob to Norton and out
of Norton to southwest
dead twigs hanging on
trees, especially oaks,
suggest that a brood of
7 year cicadas have
hatched this year. Some
also in Cumberland Gap
area.

In the Powell River valley
the slopes on up the sides
of the mountains are
pastured, but the
upper slopes and ridges
are wooded.

In Kentucky, between
Middlesboro and Corbin
the terrain is broken
and wooded. Liriodendron
is the most abundant
tree, but seems mostly

June 27 - Cumberland National
Forest ^{near Berea} directly west of
London ^{Lancaster Co.}

38733

Coreopsis

common in soft sandstone
in full sun and sand

34

Hedysarum?

common along road on sand

rather young. Mixed
forest of tulip and pine
(*hectinata* and *P. virginiana*)
and some oaks and
other trees seem to be
commonest here, but
there are also many
deciduous forests largely
tulip.

North of this is a
rolling largely cultivated
area at least to London.
West of London is a
section of the Cumberland
National Forest lying
on a flat bedded sandstone
formation. This is also
mixed, but pine is
more common than
anything else. Westward
this is considerably
dissected. The woods
do not seem very old

rays bright yellow

discovered 1749

June 28 - Mammoth Cave
"Frozen Niagara" trip.

First descent is
through vertically
cut fluted tubes in
a granular Mississippian
limestone.

Water table 3.0 ft. below
surface.

Moss around many
of the lights. Most
just protonemas, but
one light has leafy
plant with sporophytes.
Temperature 54°F.

From "Grand Central Station"
to "Frozen Niagara" the cave is
dry and there is no moss.
At the Frozen Niagara area
and to the entrance it
is more moist. There is
algae, moss protonemas
and up to high to see for
sure a number of what
appears to be fern prothallia.

Cave crickets are common
on the ceilings in lighted
fairly moist areas. They
are fairly sluggish,
hump-backed, and
with extremely long
antennae.

150 miles

explored

since 1799.

Park includes 51,000
acres of forest land.

This forest is quite
varied, some being in
various stages of regrowth
from old fields or pastures.
Stands of pure *Juniperus
virginiana* occur.

Around the picnic area
is tall mixed forest
of several oaks, hickories,
beech, red maple, and
Ulmus americana, etc.
with a well developed
under story of *Cornus florida*,
Nyssa sylvatica, *Ulmus
alata*, and what appears
to be *L. thornae*. Some of
the oaks are at least
40 m. tall. *Quercus
falcata* and *Q. alba*
have the leaves with
longer, narrower lobes
~~above the~~ on the upper
branches than on the lower.
Fagus is also somewhat
dimorphic, with much
smaller leaves on the
upper branches than on the
lower.

✓ June 28 - Mammoth Cave

Edmonson Co.

in deciduous woods on

flat ground

38735 *Ulmus thomasi*

occasional in understory

3 36 *Quercus falcata*

very common

37 *Fagus grandifolia*
very common

June 29 - from Mammoth Cave, Ky. via ~~Hickman~~ Columbus Ky. and Hickman Ferry to Elsinore, Mo.

Western Kentucky is fairly flat. mostly cultivated but with patches of woods. No hills of any size.

In the flood plain of the Mississippi south of Columbus, just west of Oakton, is a swamp with *Taxodium* and *Nyssa caroliniana* (?). 2 large cypresses seen, some smaller ones.

On west side of river a small grove of cypress

245 m.

small tree 7 m. tall,

bark very corky.

Tall tree, 30 m. tall,

these specimens from upper branches, leaves

on lower branches broadly cuneate, lobed, lobes broad.

tree 20 m. tall, fruiting twigs from upper branches sterile ones from lower.

seen east of Ft. Francis River near Fish.

Along Mississippi the sand bars, except the youngest, are covered by a dense growth of willows.

N.W. of Poplar Bluff the Clark National Forest is mixed *Pinus echinata* and oaks.

Here we encountered a terrific rainstorm.

✓ June 30 4 mi. west of Mansfield
central Ozarks, Wright Co.

38738

3

Galium

locally abundant in
weedy pasture

✓ June 30 1 mi. east of Seneca
Newton Co.

2 39 Festuca

dominant in level to
sloping fields resembling
tall grass prairie, possibly
planted, obviously used for
hay or pasture.

✓ June 30 - Osage Hills State
Park, Oklahoma

very broad ravine, 2
miles or more wide,
with sparse scrub
forest or woodland of
Quercus stellata and
scattered *Carya* sp.

1 40 Sedum

rare in open ~~to~~ rocky bed
of ephemeral stream in oak woodland

1 41 (comp.)

very common in open rocky
bed of ephemeral stream in
oak woodland

1 42 Lablavia

common in open rocky bed
of ephemeral stream in oak woodland

erect but supported by
other plants.

erect, panicle arching.

The largest trees are
8-10 m. tall, with
thick crooked trunks.
Where the trees are widely
spaced an understory
of *Q. stellata* saplings
is prominent. Thick
ground layer of grass and
herbs.

rays white, disk yellow.

flowers bright rose pink.

June 30 - Trip from Elsinore, Mo.
to Osage Hills, Okla.

West of Elsinore the woods
become almost entirely
deciduous, mostly oak.

The rolling somewhat
hilly, generally wooded
country continues to

30 miles or so southwest
of Springfield. After that
the ground becomes more
level and mostly cultivated.

Just east of Seneca
bits of prairie begin
to appear. One piece
looks much like tall
grass prairie but
may be planted (photos),
seems to be largely a
species of *Festuca*, but
on lower ground is an almost
pure stand of *Agropyron* sp.

In Oklahoma extensive
prairies appear and
woods are principally
on slopes and in broad
ravines. This pattern
is more pronounced
westward. The forest
is a scrubby woodland
mostly of oak. Some
areas of this are dead
or almost so. Fire? Disease?

Between ^{and}
Bartlesville about 25
box turtles were seen
crossing the road or dead
~~littered~~ on the road. Few
either east or west of
here.

Inside the road
leading from the highway
to the Osage Hills State Park
5 trapdoor spiders were
seen crossing road. When
molested no. of them reacted
violently pumping and
elevating the abdomen and
extending two ~~caudal~~ caudal
appendages. It retreated
only with some reluctance.
These spiders were seen
on road both in the evening
at about 7 p.m. and in
the morning at 8:30 a.m.

During the night there
was a violent thunder-
storm, with gusty wind.
Before it the weather was
extremely sultry and hot.
Drizzle continued till about
7:30 a.m.

July 23. Trip from Osage Hill
Hill to Buffalo

Westward the amount
of forest decreases and
is more strictly confined
to river bottoms and stream
margins and is less
composed of oak and
more of cottonwood and
other trees. An exception
is a considerable patch
of well developed oak
wood on flat ground
some miles east of ~~Logan City~~ ^{Logan City}.

West of ~~Logan City~~ Lamont
Cucurbita foetida, var. aff.
suddenly becomes common
along the roadside.

Between Lamont and Sand Creek
is a considerable stand
of Chilopsis linearis var.
saligna along a row of
trees, but may have been
planted. Considerable
variation in flower color.
Argemone alba common
along road. Some ^{in pastures} Artemisia ^{well east of Buffalo.}

At Buffalo the roadside
park is a tiny bit of prairie
that seems rather undisturbed
compared with the part across
the fence that is grazed

The grazed area
is mostly dominated
by Helianthus annuus
with considerable
Euthamia sp. Chenopodium
aff. album^(3rd sp.) a fine mat
of grass apparently mostly
Cynodon, with many
other herbs. e.g.

- ~ Argemone alba
- ~ Ipomoea gracciosa
- ~ Spiraea aff. pedata?
- ~ Lium (?) sp.
- ~ Bromus japonicus?
- ~ ~~Specularia~~ ^{Tridax} biflora
- ~ Legum.
- ~ Monarda sp.
- ~ Gaillardia picta
- ~ Rudbeckia sp.
- ~ Aplopappus
- ~ Tribulus terrestris
- ~ Cirsium sp.
- ~ Ambrosia artemisiifolia
- ~ Kochia?
- ~ Mirabilis
- ~ Hordeum sp.
- ~ Opuntia phaeacantha
- ~ Comandra sp.?
- ~ Euphorbia sp.
- ~ Yucca sp.
- ~ Plantago spiculosa
- ~ Croton sp.
- ~ Lepidium virginicum
- ~ Gaura sp. ~ Silene antirrhina

Solanum along road
~ Bouteloua sp.

separated from the
 fence is a patch
 of low ground completely
 dominated by a mixture
 of *Helianthus* and
Chenopodium. Grazed also.

Across the fence in
 the park there are scattered
 trees, otherwise it is not
 badly trampled, a
 medium grassland of
Bouteloua sp. *Sporobolus*
Bromus ~~terrestris~~ japonicus or sp.
 also with.

- c *Bromus tectorum*
- c/a *Kochia* sp.
- a *Lolium elaeagnifolium*
- a *Aeschylas aff. syriaca*
- c/a *Agropyron*
- c *Quercus* sp.
- c *Amaranthus gracilis*
- o *Salsola kali* v. *tenacifolia*
- lc *Hordeum* sp.
- a *Gaillardia pectinata*
- o *Chenopodium* spp.
- a *Sporobolus asper*?
- la *Euphorbia*
- o *Mirabilis*
- la *Quercus*
- a *Arabis*?
- o *Evolvulus*
- a *Sphaeralcea*

July 1 - Trip from Buffalo, Okla.
 to Capulin Mt. New Mexico.

Mainly grain fields,
 some ranges ^{upland} from
 Buffalo to Boise City. Most
 of the ranges badly
 overgrazed, ^{though some grain} and some
 even dominated by
 intermixed ^{and yucca} grain partly
 harvested and some
 plowing done. Apparently
 a maize crop being put in.

West of Boise City the
 land becomes sandy
 and somewhat irregular,
 with patches of blow
 sand with yucca. Most
 of this is range, green
 looking now, but the
 yucca and *Artemisia* show
 past overstocking.

Eastern New Mexico to
 Clayton is almost all
 range. *Junonia grandiflora*
 common along road.

From Buffalo to New
 Mexico *Helianthus annuus*
 is abundant along the
 roads and even in some
 fields.

West. Buffalo and west of Fagan
 an area covered by a strange
 low fog, thinning in high
 spots. ground very wet, air cold.

✓ July 31 - 1 mi. e. of Jet

38743 *Chilopsis linearis*
along road, probably
planted as wind-break

✓ July 31 Buffalo
in grazed prairie

1 44 *leg.*
common

2 45 *Rudbeckia*
occasional

2 46 *Monarda*
~~occ~~ common

1 47 *Plantago purshii?*
common

1 48
local

1 49 *Sphaeralcea*
occasional

1 50 *Gaura*
rare

2 51 *Lium?*
occasional

1 52 *Fileno antirrhinum*
rare

1 53 *Bromus japonicus*
same - in (mowed?) ^{ungrazed} prairie
common

1 54 *Euphorbia*
very common in disturbed spot

shrub 3 m. tall, fls
corolla orchid with
2 yellow ridges in
throat, maroon patches
on limb.

flowers deep purple.

rays yellow, disk brown

bracts mauve distally,
corolla orchid.

- 38755 ~~Pennisetum~~ *Hordeum*
 1 common
 2 56 *Eriophorum*
 common & abundant
 1 57 *Sporobolus*
 abundant
 1 58 *Bouteloua*
 abundant
 1 59 *Evolvulus*
 occasional
 1 60
 locally abundant,
 forming patches
 1 61 *Mirabilis*
 occasional
 2 62 *Gaillardia*
 common
 1 63 *Gaura*
~~the~~ common

flowers pale, closing
 in evening

ascending, very common.

ray: deep red, yellow
 tipped, disk dark brown
 petals cream white.

July 2 Capulin Mt.

top 7900 - 8215 feet
ash slopes covered by
pinon-juniper with
Quercus gambelii, *Cercocarpus*,
etc.

Some grass around crater
some salt scrub. Higher
slopes pinon-juniper.

Opuntia eminea? with
yellow flowers common.

Echinocereus is rare
Many borages, penstemon,
Th. Tenoreana, etc. in flower.

Vast broad grassy valley
and high plains used for
stock grazing. Mountain
slopes of small hills
and mountains present
a somewhat drier aspect
than the plains.

The Cimarron Canyon is

✓ July 3 Capulin Camp Ground, Canyon
above Taos

38764 *Woodia*?

in *Pseudotsuga*-*Abies* forest

65 *Fallugia*? *Cowan*, *Stansburyana*
abundant in open scrub on south facing slope.

66 *Mirabilis*
common in openings in scrub on s.f. sl.

67 *Populus*
dominant in canyon bottom

well wooded with
Pinus ponderosa, *Pseudotsuga*,
etc. some very large.
Some spectacular cliffs
above. At the head
The canyon above Taos
is similar.

of this is a dammed
stream, forming
Eagles Nest Lake. Then
a broad grassy valley.
Going down the canyon
above Taos is similar
but one side heavily forested
the other less so and with
much pinon-juniper
and scrub of *Chrysothamnus*,
Artemisia and *Fallugia*?

The forest on the south
side is *Pseudotsuga*, *Abies*,
lower down a magnificent
solid pinon forest. In
canyon bottom at upper alt.
Populus tremuloides, lower *P. trichocarpa*.

Shrub

erect, somewhat glaucous,
flowers beautiful rose pink, stamens 4.
tree 20 m. tall 80 cm. thick d.b.h.
catkins on ground.

July 3 - trip from Taos to Painted Desert
Below Taos the Rio Grande
is in a deep gorge. The
mesquite and sage on the
slopes are covered by
pinon-juniper. A scattering
of pinons and junipers
run down into the
sage.

A few miles down the
valley the terraces on
the east side are dissected
and covered by pinon-
juniper. Below this the
sage disappears and
is replaced by *Chrysothamnus*.
Some areas are fairly
desert-like. Above Santa Fe
is a large area of
juniper that seems to
be affected by a disease.
A large proportion of the
bushes are yellow, apparently
dying, a few dead.

West of Albuquerque,
especially in the
neighborhood of Grants,
the same thing was
seen.

The plains west
of Albuquerque,
into Arizona have
become dominated by
Larrea tridentata v. *tridentata*

at the point where they
appear to be grassland
rather than desert,
but most of the
green is *Larrea*.

Throughout this
area there is some
juniper and in
places some pinon.
From above Santa Fe
at least Grants
a rose flowered
Cylindropuntia, possibly
C. versicolor is in flower.
On higher spots the
pinon-juniper is fairly
well developed.

In the Painted Desert
the lava cap-rock is
eroded away, exposing
a many-colored clay layer
a semi-consolidated clay,
which erodes into rounded
hills with dendritic
ravines. The clay slopes
and ridges have either
no vegetation or a sparse
low grass that, sterile, looks
like *Panthus spicata*. The
ravines have a dense
vegetation of *Hordeum jubatum*
and a few dwarf bushes -
Atriplex, etc.

July 4 - trip from Painted Desert to
Grand Canyon, A. rim.

Some good desert grassland
inside Petrified Forest National
Monument, badly overgrazed
outside.

Enormous quantities of
short lengths of agatized
wood on surface, some
in place in "Painted Desert" clay,
distribution quite uneven.

Along Little Colorado
River Tamarix has become
dominant woody vegetation.
The *Salsola* vegetation
mentioned yesterday apparently
forms a belt along
the main highway, is
not present at in any
significant amount
along highway in park.

Many of common
plants - *Gutierrezia*, *Solanum*,
Zinnia, etc. much
more luxuriant along
road shoulder than
away from road.

✓ July 11 - just outside
Petrified Forest National Monument toward Holbrook
38768 *Comandra pallida*
roadside with *Atriplex*
and other shrubs.

Between Winslow and
Flagstaff, the highway
climbs into a relatively
luxuriant mixture of
pinon, juniper, and *Pinus*
ponderosa on a rolling
mesa. Here and there
are cleared low spots
under cultivation, evidently
since prehistoric times.
Walnut Canyon is a
spectacular gorge
cut into this limestone
plateau, down into
the sandstone which
underlies it unconformably.
On the ledges of the
limestone cliffs are
numerous tiny cliff
dwellings. The
south-facing walls
have a ~~the~~ sparse
scrubby vegetation
of *Cercocarpus*, *Berberis*,
Quercus gambelii, pinon,
juniper, etc. The north
facing slopes have
Pseudotsuga and
associated northern
species.

very glaucous.

Northward from Flagstaff the pine forest becomes an open parkland or pine savanna with grass and widely spaced large well formed *Pinus ponderosa*, forming part of the Prescott National forest. Pinyons are scattered through this. Over the rise east of San Francisco Mt. this woodland extends through a region of old cinder cones, the finest of which is Sunset crater, with a well formed crater still visible.

Descending from this the vegetation changes to a juniper woodland with a few pinyons.

This gives way to desert grassland and that in places to painted desert, the slopes in which are bare clay.

Around the canyon of the Little Colorado the flat ground has thin grass, the slopes rounded bushes of

brushes. The mountain slopes have pinyon-juniper.

The canyon of the Little Colorado is in its way as impressive as the Grand Canyon itself. It is a terrific vertical walled meandering chasm with ~~to~~ branched side branches equally deep. The walls are fluted and pillared with towers and buttresses standing out from the sides. The upper third is of horizontally bedded rock, at least the top layers of limestone. The bottom two thirds are apparently granite. At present there are only a few puddles of water on the bottom.

The south rim of Grand Canyon is flat and wooded with pinyon-juniper and ~~Pinus ponderosa~~ with sage brush at Desert View.

At higher levels the sage disappears and an open forest of *Pinus ponderosa* with some pinyon, ~~and~~ juniper and oak.

July 5 - trip from Grand Canyon to Zion Canyon

Pinus ponderosa at highest altitudes on the rim. Then piñon-juniper-oak-sage, then sage, then, below 6000 an almost pure stand of *Krameria* (coll. just west of Dead Indian Wash on slopes s. of Little Colo. R.) (photos 4 of the gap, n. end of Echo Cliffs.)

Washers have *Tamarix* and various shrubs.

At ~~Chaco~~ Cedar Ridge are fields dominated by *Opuntia* of 2 or 3 species, no *Cylindropuntia* with green flowers.

The red Echo cliffs have almost no vegetation except scattered bushes on the talus below.

Before Marble Canyon bridge around a roadside park are *Gleditsia*, cottonwood, Lombardy poplar, *Ulmus angustifolia* and elm? *fibriana*? *Gleditsia* are watered.

From Marble Canyon a gradual climb up a wash from desert up through desert grassland, heavily grazed, into piñon-juniper, and at 6800, *Pinus ponderosa* begins. On the Kaibab Plateau is pure forest of *P. ponderosa*, with little undergrowth, vigorous regeneration where not too thick.

Descent from here to piñon-juniper, then desert grassland north to Kanab Utah.

Above Kanab on way to Carmel is a very interesting sand area, with what appears to be a local *Helianthus*, extremely caespitose, almost cushion-former.

Above Carmel Jct. toward Zion are conifers and cultivated fields. The upper parts of this road into Zion are through a curiously jointed white sandstone - Navajo formation. Below this

is red (brown) sandstone into which most of the canyon is cut. It is massive and not much jointed.

In the bottom of the canyon *Acer negundo* is the most important tree, but with cottonwoods. Up the canyon toward the mountains is a loose irregular woody vegetation of *Acer negundo*, *Populus* sp., *Fraxinus* sp., *Acer nigrum* var. *grandidentatum*, *Cercis occidentalis* var.

reticulatum, *Quercus gambelii* etc.

Vitis sp. is common.

The cottonwood trees are as much as 20 m. tall, the box elder almost as tall, the ash fairly tall, the others small, up to 5 m.

July 6 - St. George

Low hills east of town are of red sandstone with sandy benches mostly of very thin soil on flat bed of sandstone.

Vegetation is a mixed desert scrub *Larrea - Franseria* but with *Ephedra nevadensis*, *Krameria*, *Lycium*, *Yucca*, *Opuntia*, *Dalea*, etc. in some abundance.

Tridens, *Pinetida*, *Claria*, *Bromus*?, and several broad leaved herbs common.

Lower slopes, below lowest ledges are very alkaline, with a white crust.

Obviously seepy at times. Here *Anemopsis*, *Phacelia*, *Atriplex*, *Baccharis*, *Linum*, and several herbs, *Juncus effusus*, etc. are common.

A number of weedy plants, *Lactuca*, *Salicola*, etc. are common.

Just now this entire slope is very dry and powdery.

Atriplex,
arborescens

✓ July 5 slopes south of
Little Colorado River just
west of Dead Indian Wash

38769 *Krameria*
dominant shrub over
large areas of rocky slopes

70 *Fallugia paradoxa*
in small ravine on dry slope

July 5 - Zion Canyon
below Narrows

71 *Acer nigrum* var. *grandidentatum*
very common on talus
at base of cliffs

72 *Acer negundo*
very common in canyon bottom

July 6 - St. George

alluvial hills east of town
73 *Psathyrotes*
on bare ground in full sun

74 *Eriogonum*
common on bare ground in full sun

hills of red ~~sand~~ sandstone and fine sand
75 *Tridena pulchella*
common on ledges and
thin sandy soil

76 *Larrea divaricata* Cav.
common generally

77 *Hilaria*
common on sandy places

78 *Mentzelia* ~~alt.~~
occasional on sandy soil

6000'

rounded shrub 2.5 m.
tall grayish rigid.

shrubs 1.5 m. tall, flowers
white, mostly faded.

small shrubby tree,
4 m. tall, sterile.

tree 5 m. tall (others much
taller), racemes pendent.

860 m.

flowers yellow, odor very
strong, sage-like.
flowers white.

tufted

shrubs 1 m. tall, with
strong oily odor; flowers yellow.
loose bunches

flowers yellow

- 33779 *Eriogonum*
 local in sandy soil
- 80 *Baileya multiradiata*
 occasional in sandy soil
- 81 *Illinoia incarnata*
 occasional mostly
 tangled in bushes in sandy soil
- 82 *Hugella*
 rare on sandy roadside
- 83 *Prosopis glandulosa*
 rare on sandy soil
- 84 *Anemopsis californica*
 locally abundant in
 drier seepy places.
- 85 *Orthocarpus*
 very local
- 86 *Pluchea sericea*
 rare
- 87 *Prosopis pubescens*
 occasional
- 88 *Castilleja*
 very local

scapes of larger plants
 - inflated; flowers yellow.
 rays bright yellow.

flowers purplish,
 faded in late afternoon

flowers blue-lavender,
 - on most plants faded.
 shrub 2.5 m. tall. flowers yellow.
 pods on ground.

flowers white.

low bushy much branched
 brittle herb; flowers
 white with yellow tips,
 bracts green slightly purplish
 - distally.
 shrub 1 m. tall.

shrub 3 m. tall,
 flowers yellowish,
 - fruit immature.
 erect, up to 1 m. tall.
 older plants sparsely
 branched; bracts scarlet
 distally; flowers yellowish.

July 7 Trip from St. George, Utah

Larrea and *Prosopis* in St. George region of Virgin Valley and west of Beaverdam Range show absolutely no sign of the freeze of 1936-7. Stems of *Larrea* are

From the Beaverdam Mts. to the top of the range west of Panamint Valley (Ogden - Inyo range) is *Larrea* - *Trachypogon* in a variety, except for some stunted flats and ~~dry~~ dry lakes and the salt pan floor of Death Valley. There are extensive high sand dunes east of Stove Pipe Wells.

The *Larrea* is generally less than 1 m. tall except along roadsides. For a few yards on either side of a gravel highway the *Larrea* bushes are generally 1.5 - 2 m. tall and much brighter green

v

July 7 - ^{Lower} Rock Creek, 2.5 miles
of Bishop, Sierra foothills, Mono Co.

97729

Pinus (*Pinus ponderosa*) *resinosa*
common in mixed pine
forest among granite boulders

90

Betula

common along stream under pines

than generally. May be that moisture is trapped under the pavement and that the root systems can get at it, even from several yards away. The immediate road side for a yard or more, has an abnormal luxuriance of herbs of various sorts.

The top of the grass between Inyo and Inyo ranges has only *Atriplex* and similar shrubs, also down the west slope - only a very few creosote bushes seen on west slopes till the relatively level valley bottom is reached, where there is an area southeast of Owens Lake. Otherwise the uncultivated parts of Owens Valley is mostly dominated by *Atriplex* and *Artemisia tridentata*, etc.

- 500 m.

much branched glaucous
subfruticose herbs

shrubby tree 4 m (others seen to 6 m)
all.

- 91 *Pinus*
common in open woodland
on great rocks
- 92 *Oryzopsis*
same
- 93 *Eriogonum*

Lower Rock Creek Camp
is on the Rock Creek at
2500-2600 m. in open woodland
of *Pinus monophylla*,
and *P. jeffreyi* (or *P. sabiniana*)
a large 3-needled pine
with leaves $\frac{1}{2}$ in. long
and heavy cones with
shiny scales, & rough
bark), some *Larix*,
openings filled with
Artemisia tridentata
and *Pinus* sp. *Betula*
and *Populus* tree crops
along the creek.

The whole is on the
upper part of an
alluvial fan of
large granite boulders
and smaller debris.
Grayish chipmunk
common.

Oryzopsis and a tall
Stipa and *Eriogonum*
and *Gilia nuttallii*
very common.

shrub 1 m. tall, leaves white
beneath; bracts white

has small tufts.

dwarf shrubs;
flowers bright yellow.

North from Rock Creek
Pinus decreases rather
markedly and *Artemisia*
increases in extent.
The boundary between
forest and sage seems
more abrupt.

Mono Lake appears
rather alkaline. Ducks
are rather abundant. Gulls
common. Piles of pale
clay along edge of lake.

Lone Pass
a rocky, with sparse
uneven stand of *Pinus*
contorta var. and *P. sabiniana*.
Country rock is
granite with pegmatite
veins.

The *Pinus contorta* here
has enormously thick and
rapidly tapering trunks
compared with that in the Rockies.
Maximum 20-25 m. tall 1.5 m. dbh.

✓

July 8 - Sonoma Pass

22794

in open pine woods on granite
Pinus contorta var. *monophylla*
 dominant tree

July 10 - south of San Francisco

Ocean bluffs of
 shale and fine sandstone
 covered by a low ^{semi-erect} ~~erect~~ thick herb
 growth, at edges a

Alrovia
maurandiae
massalygoidea
thunbergii

succulent garden
 of *S. Elaeagnus*, *Plantago*,
Erigeron, *Eriophyllum*?,
Helianthus? *Lupinus*??

Yellow *Lupinus*, shrubby,
 common a little farther back.
 Also *Baccharis pilularis*,
Leucophyllum, *Rhus*
diversiloba, *C. caninus*, *Rubus*,
Antennaria, *Isotria medeolae* etc.

Many of these are mostly
 confined to slightly
 sheltered spots. *Eriophyllum*
 is most conspicuous of
 all, at least at this
 season. *Castilleja* varying
 in color from scarlet to orange.
Minuartia (*Liparis*) of red, orange
 color, very prostrate calyx.

~~tree~~

tree up to 20 m. tall with
 thick strongly tapering trunk.

On sand are patches of
 a characteristic low
 assemblage of *Sisymbrium*?,
Scirpus, *Cochlospermum*,
Soldanella, *Yucca carnea*,
~~*Stedman*~~ *Melilotus indica*?
Amorpha?, *Franseria*,
bipinnatifida, *Calce-*
fruticulosa etc.
Alrovia maurandiae has
 a very enlarged root, to
 6 cm. thick, elongate.

July 14 - Dickery Ridge
~~around~~ ^{near} visitor center
 building is a planted
Ilex opaca.

Compton Mt.

Completely wooded,
 some rugged rock outcrops
 near and at top.

Woods quite mixed
 in places dominated by
Quercus prinus, on top
 by *Q. rubra*, mostly no
 clear dominant.

Species seen:

Lilium americana s. *neglecta*
Juglans cinerea
Palthenocissus quinquefolia ^(var.)
Polypodium vulgare
Acer pensylvanicum
Acer spicatum
Hemlock americana
Robinia pseudo-acacia
Ledum telephrioides
Rubus odoratus
Rubus occidentalis
Prunus virginiana
Quercus rubra
Quercus alba
Amelanchier canadensis ?
Lolidago caesia
Silene stellata
Eupatorium purpureum
Arabis racemosa

2700'

Dryopteris marginalis
Monotropa uniflora
Monotropa hypopitys
Ostrya virginiana
Cornus sp.
Arisaema atrorubens
Scutellaria ovata
Ribes ^{*sp. (var.)*} ~~*americanum*~~
Anemanthium muscatronum
Hamamelis virginica
Aster sp. *macrophyllum*
Menziesia pilosa
Rhododendron sp.
Dioscorea quaternata s. *glauca*
Vaccinium vacillans
Gillenia trifoliata
Aralia nudiflora
Smilacina racemosa
Monarda
Galium latifolium
Thaspium atrorubens
Rosa carolina
Hedysotis purpurea s. *unifolia*
Spiraea betulaceifolia
Castanea dentata
Cnicus quadiuncula
Hydrangea arborescens
Salix humilis
Aquilegia canadensis

Jacquinia oblongifolia
Eupatorium suberectum
Danthonia spicata
Aporosa androsaemifolia
Rhus toxicodendron
Crataegus mollis
Lonicera hispidula
Corylus cornuta?
Carya
Deschampsia cespitosa

below
 24
 21 m.

Achillea millefolium
Tirosterium
Lobelia cardinalis
Cirsium lanceolatum

July 14 Compton Mountain
 wooded rocky summit

38795 (grass)

rare on great rocks in crevices

96 *Cornus rugosa* var.
 between great rocks

97 *Monotropa hypopitys*
 rare on open

Habitats that should be
 included in R.P.

Roadside

Roadside edge of woods

Rocky road cuts

Along road cuts

Along below road

Exposed rock cliffs

Shaded rock cliffs

Gaylussacia racemosa
Amelanchier laevis
~~*Cryptotaenia canadensis*~~
Aster lanceolatus
Penstemon rotundifolius
Antennaria plantaginifolia
Prunella virginica

Cimicifuga
Anemone virginica
Rubus argutus
Fragaria virginiana
Trigonostemon
Sassafras albidus
Rhus glabra
Carya cordiformis

904 m.

summit

shrub 2 m. tall, leaves
 grayish beneath
 and somewhat reddish.

Shaded rock outcrops
 Springy places
 Meadows on broad ridge tops
 Open slopes
 Dry hemlock woods
 Wet hemlock cover
 Quartzite ridges
 Shale or quartzite talus
 Rock-filled valley heads

Lower deciduous woods

Broad leaf coves.

Chestnut oak woods on steep slope

Chestnut oak woods on broad
flat ridge tops.

Quercus ilicifolia scrub.

Grass ridges and flats.

Scrub forest on steep

dry west slopes.

Quercus coccinea forests.

Pinus virginiana forests

Pinus rigida forests

Clearings growing up
to thickets.

Swamps

Wet ravine bottoms

Quercus rubra forests
on high ridges.

July 20 - Washington D.C.
9:40 p.m.

In the flood-lights
trained on the Capitol
dome were a number
of birds, perhaps a
half dozen or dozen,
flying around
and round, apparently
feeding on the insects
attracted by the
lights. They were
probably night-
hawk (as white pro-wings)
They had long, somewhat

back swept wings,
the ultimate joints
slender and with
a conspicuous white
patch.

1957 Maryland
July 21 - Sugar Loaf
Mountain

The mountain is
a knob of pinkish
quartzite, with
cliffs and large
boulders near the
top.

The whole mass
is well wooded
with mostly
deciduous trees.

The top dome is
covered by a mixture
of *Quercus prinus*,
Betula lenta, *Quercus*
nubra?, *Acer rubrum*,
and a few pines.

There are *Pinus pungens*
and *P. virginiana*
with a few that
look rather intermediate.
The trees up here are
rather small
mostly under
30 cm. dbh. and not
very tall. Many
dead chestnuts.

The understory, 2-3
m. tall, is mostly
Hamamelis, *Cornus*
florida, young *Carya*,
Betula and *Quercus*, etc.

On the ground *Acer*
quadrisulcata is
abundant, some
Phytolacca, *Rubus*,
Spiraea betulaeifolia,
Rhus toxicodendron,
etc. Scattered *Kalmia latifolia*
and considerable *Vaccinium vacillans*.

On the lower slopes
the forest becomes taller
but thinner, more
logged over (not
recently), includes
much *Robinia*, *Quercus*
prinus, *Q. acuticarpa*?,
Carya spp.

Undergrowth is
sparse - some *Acer rubrum*,
young oaks, locust,
hickory, much *Phytolacca*.
Considerable *Vitis* and *Parthenocissus*.

At this time everything
is obviously drooping
from lack of water.

July 25 - Air trip, Washington
to Folkswold, N.Y. over Annapolis
- Baltimore

The Anacostia river,
where it abruptly
narrows to a small stream,
with color of tomato cream
soup. Above this, dark green.
Apparently this is the
result of large scale
cutting into the clay
subsoil on areas being
developed as residential
sites, on park-way
interchanges, and
factory sites.

From Washington to
Annapolis the ratio of
forest to cleared land
is estimated at about 3:1
at least to the north of
the line of flight. The
forest land is a mosaic
of all stages of old field
succession and mature
hard-leaf, ~~oak~~ pine, and
mixed forests.

East of Annapolis Bay
the ratio about reverses
itself, or may even be
1:4. Less cultivation is
evident, even though the
land looks sandy.

On the coast are large

areas of tidal marsh
especially along Delaware
Bay on both sides.

The northern edge of
the Pennsylvania is being
considerably cut into
by cultivation. The
streams and estuaries
now stand out as very
black, against the
dark green vegetation.

The New Jersey soil is
generally light colored
along the line of flight,
roughly along the Penn
border, but is
mottled with darker
areas, somewhat as
the northern middle western
soils in glaciated areas are.

Northward the Plains
area stands out clearly
with the stream pattern
in it seems to bear
some relation to its
distinction from the
surrounding tree-covered
areas. Should be looked
into. East of this are
considerable attempts
at reclamation for
agriculture. Very poor
plains, but without distinction
stream pattern. Also many
old river courses with white sand showing.

Some new black pine
scars with stream
courses outlined by brown
dead trees, butted out
not burned by the fire.
- Subdivided areas
and undulating areas
near Lakehurst.

San Juan is about
an ideal altitude for
reconnaissance observation.

July 24 - 5 miles N. Y. &
San Juan, Puerto Rico

7100

About 1/2 hour out of San Juan
a circumposed cloud layer
was observed - low

layer of puffy cumulus.
then a thin layer of
stratus - cumulus at perhaps
4000-5000, a layer of large
very high cumulus
from 15000 to 20000 or so then
a layer of alts. stratus
at 3000-4000 - seemingly
radiating from a center
near the west.

The second layer
became rapidly
thicker toward San Juan
(the sun illuminates
the bottoms of the clouds
with beautiful effect) then

the cloud appeared almost
completely.

San Juan, Puerto Rico
in part
plants seen:

Ichthyophaga sprangeri
Cestrum nocturnum
Codiaeum variegatum
Philodendron oxycardium
Geophila amentacea v. *williamsii*
Polyscias guilfoylei
W. aurea *leucodendron*?
Peperomia *avensis*
Philodendron with basket for
Dioscorea with gray spots
Dioscorea *maculata*
Polyscias *trichocarpa*
Coelocarya *uvifera*
tall green stemmed bamboo
Sansevieria broad leaf variegated
Peperomia *obtusifolia*
thick leaved "plant" brown leaf
Arecia sp.? *pedunculate*
Alpinia *purpurata*
Phoenix *rebelinii*?
Pandanus sp.
Gnaphalium sp.
Pedicularis *lithyrmaloides*
Bursera *puerari*?
Colas *scutellarioides*
Pseuderanthemum sp.?
Grewia *religiosa*?
Dirca *moenchii*

July 26 - Belém de Pará

main
street

The main downtown street is lined with large mango trees, some two of them with unripe fruit. The trunks are white-washed to about head height. In the main branches epiphytes, mostly several kinds of orchids, are abundant.

In a small square are two large trees of *Cassia grandis* (or perhaps a hybrid involving it, as the flowers have a yellowish tinge). up the whitewashed trunk of ~~these~~ is a termite gallery. This branches and a gallery runs up each branch, rebranching even on ~~some~~ of the smaller limbs, down even to rather small twigs. When this is broken swarms of fast-moving soldiers run out and search the vicinity, vibrating their heads frequently. This gradually subsides over a few minutes. After 7-10 minutes or so the commotion had quieted and rows of soldiers were quietly standing guard along both sides of each broken part of a tunnel.

Common street trees and shrubs are

Mangifera indica
Cassia grandis
Rhapis flabelliformis
Levingtonia clunensis
Roystonea elata (or regia)
Ficus retusa
Plumeria rubra
Calharranthus roseus
Pedilanthus tithymaloides
Crota coccinea
Xanthosoma violaceo
Alocasia macrorrhiza
Yucca sp.
Cordyline terminalis
Heliconia sp.
Cassia fistula
Sansevieria roxburghii
Cassia spectabilis
Lebrun rose-sinensis
Cinnam sp.
Rhoeo discolor
Tabernaemontana sp. ? (purple)
Bongainvillea spectabilis
Peinodaphnus aureus
Rapodia formosa
Allamanda cathartica
Urera *filicifolia*
Calathea (white lined lvs)
Hemigraphis (purple beneath)
Axonopus compressus (brown grass)
Euphorbia "splendens"
Polycias guilfoylei

Ornamentals in outplant
Euphorbia gossypifolia
Cassipouira barbadensis
 (tree 3-4 m.)
~~Platanus~~ *Euterpe* sp.
Lagerstroemia indica
Mulvanisium
 a few coconuts.

July 26 - trip by air Belém -
 Santarém - Manaus
 Lw. Manaus 13:40 C-46

Near and around airport
 at Belém considerable forest,
 mostly ragged second growth
 but several patches look
 relatively good. The second
 growth has scattered
 trees from the original
 forest emerging far above
 the general level.

The islands near
 Belém have swamp forest
 with the top story open
 but a complete second story
 mostly of palms. Patches
 of *Montscharardia* around
 the edges. The composition
 of the ~~main~~ top layer
 seems quite diverse, and
 the

On the way to the airport
 are a number of swampy
 waste areas covered by
 a tangle of *Montscharardia*,
Cassia alata (11), *Cecropia* sp.,
 and other trees incl. the
 graceful caespitose palm (~~the~~ ^{*Euterpe*})
 and tangled with vines
 several of palms. Canopy to 5 m. tall.
 Some areas of this type
 have been recently cleared.

A 129 Broken grassland and forest,
 forest especially near stream.
 Stream very muddy.
 Then mainly forest with
 rigid streams. A few small
 clearings.

When there is considerable
 distance between streams
 there is grassland, rather
 dark brown in color, probably
 marshy, with patches of
 wood. Very smooth in
 appearance from about 5000'.
 Small clearings become
 more abundant, especially
 near streams.

Paths across grassland
 stand out as though soil was
 light colored sand, but soil
 in clearing is reddish.
 Grassland patches much
 smaller, very small.

B 135
 San Miguel
 de las Yaguajayes
 Manajó

C

n. of
Paua~~Paua~~
marajó

practically no grass now
except obvious clearings.

Large broken cumulus
clouds seriously obscure
vision over most of this
country.

There are some evidences of
shifting cultivation, but the
greater part of the forest looks
undisturbed.

D

7:10
n. of
~~Bara~~
Bara do
Cassimá

Soled forest except for
rivers. However, what
appear to be filled watercourses
stand out very sharply
because of a lower more
fine-textured vegetation.
Very much obscured by clouds.

E

7:20
Rio Cassimá
Rio Amazona
in distance

Soled forest but with a muddy
stream in the distance. A
small oval area in the forest
appears to be white sand
~~with~~ with scattered bushes
or small trees.

Red ~~even~~ even in texture
emergents apparently abundant.
Color dark brownish green, mottled
with lighter or somewhat reddish
trees.

F

7:7
Rio Xingu

Crossed large river with
some small sandy beaches

and with many inlets
on both sides. This river
much less muddy than
others seen. Inlets are
muddy but seem to
influence very little the
river. Streams running
into the inlets are black.
Some ^{small} grassland patches
near these streams
on west side of river.
There are brownish, straw color.
Many streams in
forest, all black water.
Small sandy patches
cleared near streams,
sand reddish.

Patches or strips of
different vegetation, lower,
fine-textured, go from
these black streams into
the forest. Possibly swamp.

H

7:37
Rio Jarauai

Following is south of a
small stream that
lies in or on the edge of a
strip of grass of some
width. The grass is quite
irregular but with no
apparent pattern. But
scattered along stream.

Parts of the grassland are
wet. Crossed this stream at 7:40

I

After this a large expanse of apparently undisturbed forest. Emergent trees quite abundant. Many of them lighter green than the rest of the forest, or yellowish, or brownish, or reddish. The yellow ones must be flowering.

Immense clouds still about. A few large trees are bare, but these not conspicuous from this altitude.

J 7:17 Crossed a small stream
Rio Guayana running north, lined by what appears to be swamp. Farther down, the margins appear to be cleared and sandy forms a larger stream in the distance, running northeast, also with cleared margins.

K 7:52 A few small streams lined with narrow swamp strips.
Texture of forest varies somewhat locally.

7:57 In distance to northwest vast flooded area.
Rio Purusinha The water here is dark, not muddy. Much wet grassland, some swamp forest, especially

Rio Amazona along a very large reddish, muddy river. In island in this Rio, a dense green clearing.

M Beyond river again, vast flooded, partially wet grassy area. Along to west bank of river a narrow, low wooded natural levee, some of stream courses in flooded land lined with trees, others not.

Many clearings in natural levee of river.

Flow water in this side greenish, somewhat muddy, not as black as on other side.

Wet grassy areas bright green, mottled with lighter and darker green.

N 3:04 Turned to left somewhat.
Lago grande ~~This may be Rio Tapajós~~
3:10-13 Much more flooded land. Also what appears to be many old stream courses. Part grassy part wooded, the wood mostly cleared except where swampy.

The pattern of strips of grass, swamp, and forest is very hard to understand here.

O
R. Amazon River again very muddy, flooded land with black water. Many clearings, much shifting cultivation on islands and strips of slightly higher land.

Patches of what must be *Victoria regia* in ponds stand out & very conspicuously look like gigantic duckweed from 4-5/11.

P
S. of
Santarem

Away from river the topography roughens and there is little good forest, much shifting cultivation, and some savanna and deciduous forest.

Ban trees very conspicuous.

Vegetation here is really very complex. This is the Santarem region.

Where a large black-water river (Tapajoz) empties from a flooded area into the muddy Amazon, the area of mixing is very conspicuous and narrow.

Circled, descending 3:15 - 3:29

July 27 Santarem

The soil here on a small hill where a low cut is available is a conglomerate, semi-consolidated, of irregular nodules of ironstone, formed, in the opinion of van Flecken, by the breakdown of an old lateritic crust. The matrix is a reddish-yellow loamy material. Below this is an exposure in the street of what may be an actual crust. This may, however, be a compacted layer of the nodules.

Out in front of Santarem ~~between~~ perhaps, km can be seen a striking and sharp boundary between the black water of the Tapajoz and the yellow Amazon water. Many small rapids of reflection in the Amazon part.

Black vultures are present in fair numbers around the city, and have very little fear of man.

Yesterday evening a very considerable number of what appeared to be scissor-tailed flycatchers were flying around a banyan tree at about sundown.

At the airport the surrounding forest is a low irregular down type apparently much cut over in the

poor, rather sparse, some
deciduous trees.

The clearing along the
strip.

33793 *Pachalanthus*
edge of air strip

July 27 - on the Lantana - Maricao
Considerable cleared and
brushy land is south of Lantana
along Papago. Land between
Papago and R. Arizpense is partly
~~about~~ in grass some
with a scattering of small
bushes. Boundaries of these are
very irregular, not at all angular.
Of the forested part some is
clearings in various stages
of revegetation after shifting cultivation.
The clearing tend to be irregular.
A similar pattern is evident
between the Rio Arizpense and Lago
Grande de Palo Verde.

And westward here the grass
rapidly becomes less, and
the lake shifting
cultivation evident all through
area south of Lago, but not extensive.
Route turned slightly southward
to the way to west end of Lake
Chauduners and Braziers
begin to increase. Scattered
low cumulus. The forest

covered by low semi-herbaceous
growth mostly *Casahuate* spp.

On sandy soil with quartz
pebbles. Red for common, some grass

at corner more continuous,
shifting cultivation less and
less evident.

Southward, along Rio
Arizpense, in the distance,
large grass patches are
visible, but rapidly
becoming less westward.

Along corner sparse
dendritic patterns of
lower, finer textured forest,
probably represent swamps.

Between south of Lago Grande
de Palo Verde the land is solidly
forested.

Cumulus becomes much
more abundant.

To south dendritic patterns of
swampy forest become numerous
and abundant. Also conspicuous
as headwaters of Lago.

Approaching Comayon
the dendritic irregular
parallel sloughs parallel with
the main river. Mosaic of
grass and woody vegetation between them.

On the other side of the
river are vast stretches of
mostly water and light green
wet grassland with some
wooded land and swamps.
As usual, the main channels
of the river are muddy, the
other water clear or dark.

To the south much water,
in places more than land.
How much of the light
green is wet land and
how much floating mats
of vegetation is not at all clear.
Complex patterns of old
channels, especially in the
Las Oreas. Apparently much
sand here. Probably the
abundant light green is
grass on a wet sand
surface.

Taking south of Lago de Parana
most of the land enclosed
in the great bend of the Amazon
here is inundated. Some
wood grassland and forest
especially along the river bank.
Striking meanders of small
streams here, partly outlined
by strips of forest. South of
this also mud water and
much ~~or~~ wet grassland.

Reflection of sunlight shows
that the light green grass here

considerable standing
water between it.

Northwest of the Amazon
and south of the Parana de Belven
is another complex area of water,
wet grassland and ~~to~~ forest
or swamp, again with
a complicated pattern that
must represent old channels.

South of the river here
is a curious mosaic of
low drab-green vegetation
with the dark green forest.
View not good enough to
make out what this is. Some
water here but not
very much.

Westward of ~~Stapinaga~~
~~Stapinaga~~ and south of the
Uatuma the landscape north
of the course becomes
flatter again with little water,
except the Rio Uatuma to
the north and occasional
small irregular bodies in the
forest. But to the south of
the course the Lago Parana and
Lago Canacari form large
bodies of water very complex
with bars and islands.
In the forest to north of
course ravines and small
streams become quite
noticeable. In general, there

is far more water than one gets any idea of from the DAC charts.

Sagoré de Arari in the distance is small, forms a much more ~~impressive~~ impressive body of water than appears from map. The forest between the Purutu and Amazon appears not at all disturbed by man, very much cut by dendritic stream patterns. The more ~~important~~ important stream is lined by swamp. This stands out very sharply in late afternoon sun, both because of shadows and color differences between forest and swamp. The swamp being a drabish green, rather than the dull dark ~~green~~ green of the forest.

Rio Urubá is extremely complicated, and is ~~not~~ certainly cut down into a slightly elevated plain. This impression of a slight rejuvenation has been increasing since Tapiranga.

South of course the Amazon has sloughs along both banks, not so close together as most of those

seen previously.

North of course the rejuvenation has increased so the ground actually looks better. All densely wooded, but with swamp forest occasionally along some streams.

Along the Amazon west of Casa Casimiro is some cleared land, especially along the north bank which is somewhat high. South bank is lower and with much water and wet grasses. The north bank has low bluffs 20 m. or so high, in places worn down to slopes. Westward these bluffs become a bit higher and more conspicuous.

Just stretches of water to south.

Island east of Manaus has considerable areas of forest that seem in very bad shape, possibly the trees have been killed by burning or girdling. These patches are irregular.

Approaching Manaus the bluffs are higher and much dissected. Mostly wooded. Land back of them dissected and wooded.

Sloughs become more and more numerous

July 28 - 4 km n. of Manaus

tall rainforest trees 30-40 m. tall, gradation of sizes from 1 cm to rarely 8 cm. and spread from 2-5 m. with abundant saplings and shrubs

Trees *Labotacca*, *Equimacra*, *auracea*, etc.

Palms principally in undergrowth

Undergrowth is fairly abundant, to 4 m. high.

Can walk freely but must push bushes aside.

Very few ferns, some herbs such as *Caranto*, but much ground exposed, covered by leaves. A brownish gray clay surface with no evident organic matter.

Many epiphytic tree lichens, mosses, the *Polypodium*.

Many *Dracenas* vine climbing close to trunks - *Pulicaria*, *Aspidistra*, etc.

Canopy here rather thin perhaps 75%, locally thicker.

The tree habit here is characteristic clean - trunked umbrellas etc.

Has been selectively cut over for economic wood. Leaf epiphytic, ^{with} undergrowth, abundant in old leaves, in those such as palms that persist.

This general area between here and Manaus is ~~an~~ dissected block of fine sandy sediments slightly bedded, pinkish in color. Here and there in cut, may be seen a thin layer of small concretions, not comparable with the bedding. Said by Stenberg to be concretions formed in situ without relation to bedding. The cuts are frequently darkened by a thin layer of algal discoloration, dark manganese purple in color.

Between 21 and 22 km north of Manaus are small areas of grayish white sand, really podzolic in appearance, with a thin ~~top~~ yellow-brown layer on top. ^{In some profiles, one} ^{irregular thin films or} ^{of fine dark organic material}

separated by thin layers of what sand

The vegetation here is different, but has been burned over so is not to be taken as necessarily typical. Besides shrubs of various sorts *Pteridium aquilinum*, *Lycopodium cernuum*, *Paepalanthus*, and several grasses are prominent.

Cleared areas in the forest are largely grown up to several species of *Cecropia*. Toward Manaus the entire

July 28 - 21 km. north of Manaus

On white sand in open scrub.

33799 *Paepalanthus*

33800 alga

forming crust

July 28, 10 km. north of Manaus

33801 alga

Thin crust on vertical road cut on pink fine sand.

vegetation becomes a secondary thicket type with abundant palms of several species, *Cecropia*, *Viscainia*, *Heliconia*, and tangled with vines. Shifting cultivation being practiced here and spreading along the road.

letters
refer to
red letters
marked
on WSC
charts
Aug. 1
A

Aug. 1 - trip by air from
Manaos to Santarem
(in Catalina, south side of plow)

Ravines in Tertiary terraces
are rather steep walled and
the walls well wooded, black
water in bottoms of parts
near river.

Smaller islands are
a series of subparallel
channels and ridges,
channels with water
or wet herbaceous vegetation.
Difficult to be sure if
"wet grassland" seen
on trip up river is
always grass or if perhaps
some is floating vegetation.

careiro? Large island below
mouth of Rio Negro is
largely wooded, many
of trees leafless at this
time. Many clearings along
south side. The lake is
greatly enlarged now
and some of wooded strips
are still flooded, the trees
sticking out of the water.
Areas of herbaceous vegetation,
perhaps floating, with
mostly leafless trees with
white trunks scattered
through them. ~~to~~ Down

B

C

stream somewhat, still on
island, no strips of
leafless trees separated
by green strips much
narrower. Camargo says
the trees lose leaves during
inundation. Certainly
those on lower ground are
the leafless ones. (6 + w. photos to 31)

Shallow spots along
banks with a blue-green
vegetation, probably largely
fishes. Much of the
herbaceous vegetation
is floating, and when
the water rises (acc. Camargo)
it detaches itself, and
forms enormous rafts,
to 200-300 m. long.

About 1/4 the trees on
some areas almost all in
others are leafless. A few
are in flower.

Systems of old meanders
and channels and "restingas"
or natural levees are very
complex. The enclosed water
is dark and with little silt.

New bars covered mostly
by herbaceous vegetation.

Montrichardia swamps
seen almost from time of
leaving Manaus.

A few houses on levees.

In addition to elongate channels on the islands there are roundish & slightly lengthened ponds, the smaller ones filled with floating vegetation.

D

Ilha Ilha-Grande is a much more mature example of the islands built up of successive restingas. Mostly wooded with a few channels and meanders. Some elongate areas toward the lower end appear to be Montichardis swamps with sparse tree cover.

The Amazon is café-m. last color, all of the still water dark brown.

Below here palm swamps appear. Extensive Montichardis swamps, large areas of floating vegetation. Meandering channels lined with strips of forest.

Cyphophyllum spruceanum
Hura crepitans

Triplaris surinamensis

Crataeva benthamii

commonest trees are *Mimosa*
grasses *Paspalum fasciculatum*

Echinochloa polystachya

Haploenathus amplexicaulis

geological map of Brazil
1/500,000 Mapa geológico do
Brasil 1942 based on topographic
& air photographs
Uperanga, L. Pauls.
with Divisão de Geologia e
Museologia. Ministério
de Agricultura, Rio de Janeiro

E

South of river e. of
Reserva. Many trees in
forest just coming into
leaf, some *prot. Tabebuia*
and *Triplaris* in flower

One way to distinguish
floating ~~from grassland~~ vegetation
from wet grassland is by
the existence of trails occasionally
in the latter. Some grass
floating, some attached. In
some floating mats of grass
the center appears dead, the
margins green.

F

Area west of Parintins
large areas of grass, both
attached and floating, mixed
with some patches of wood.
Occasional *Victoris regia*.
Herons (white) fairly common,
gregarious.

Grass may be attached but
in water to 3-4 m. esp. species
of *Orzyza*. Some clearings here
and houses on piling. Cattle
grazing in water.

Patches cleared with large bundles of ^{just} macerating in water.

Tree with white trunk, mostly bare, seems to be *Triplaris*.

The wet grasslands in many places are grazed.

Foré is only produced near the water.

4-10 P-1 to 2 ^{mi} w. of Parintins.
cols 9-6 to 14 ^{mi} w. of Parintins.

G Parintins - old Japanese colony, plantations of rubber & Brazil nuts.

H Below Parintins an area of magnificent rain forest, with scattered trees bare, many with new light green leaves, a few in flower, bright pink ^{red & white} some with white or yellowish flowering vines over their tops. Emergent trees common. The various shades of green and other colors making a vivid mosaic. Palms very common in canopy but not as emergents.

Forest of slightly lower elevations, possibly many distinguished by lack of emergents, lighter general color. Babassu palms.

rest of both rolls taken of the forest east of Parintins, the last dozen or so of low with telephoto lens.

Eastward a few shifting cultivation clearings, especially but not all along a small watercourse mostly hidden by forest. Small ravine in forest & a few *Adonidia* palms. This is on the Tertiary terrace.

I Eastward, in Rio Aripuanã drainage and north of it a few small hills. Stream course lined with babassu palms. Small area perhaps former clearing, pure stand of a smaller palm.

J Hills more numerous eastward north of main part of Aripuanã. More shifting cultivation. Swamps immediately along river. Patches of scrub savanna with small scattered *acaule* palms, some trees. Old stream course with white sand.

Rio Arapiunus has black water, occasional white sand beaches, mostly rather steep banks. Forest here has less trees without leaves and less with young leaves than back a bit, more somber green color. Some small sand barrier ridges in edges of river, also hooks at ends of capes, pointing upstream. All this in 'estuary' part of stream.

Shifting cultivation clearing in all stages of cycle.

Between Arapiunus and Tapajos some beautiful forest with numerous emergents ^{and} with bright deep yellow flowers, some other flowering trees, a few bare ones, palms with what appears to be distichous leaf arrangement (Coryzocarpus).

Rio Tapajos has ^{part} ten sand beaches on west bank, also low pinkish bluffs there bar.

Much higher isolated hills (200 m.) east of Tapajos near Belterra. Alto do Chao. Tertiary erosion - remnants of these bars or almost so.

West on this side seems more dry, far more trees bare of leaves, some areas almost savanna.

Narrow white sand - pink sand beaches, pink bluffs.

Tidal influence here makes sand spit, pointing upstream. Some siltiness from Amazon noticeable here.

Laterite boulders at bases of some of the bluffs.

Some sand points are covered only by scattered shrubs.

Contrast between the dark clear water of the Tapajos and the light cape-au-lait of Amazon islands across Amazon from Santarem out of parallel strips of restinga, wet grassland, and water.

Separated by large channels of the Amazon and containing ponds and large to very large lakes. Much clearing on restinga and swamp, the latter for jute. Vast Montrichardia swamps around lakes.

Canals cut through restinga

Q

from Amazon to large lake by drainage to let in silty water to fill lake and make land. The filling is very obvious at the inner part of the two largest canals. Herd of water buffaloes. The water runs into the canal because of evaporation from the lake. Droops an enormous load of silt. The water is very muddy in comparison with other lakes of this sort. The current into the canals is very noticeable.

Large patches of *Cecropia* in restinga, representing abandoned clearings, separated by patches of degraded all forest. Triplaris in flower here. Much fruit along river.

Around channels and small lakes the wet grasslands extend out over the water as floating mats.

Aug. 1 - boat trip Santarem to Maracum, on north bank of Amazon below Santarem. Small floating rafts of grasses occasional.

Along north shore in islands pioneer situations occupied by *Salix martiana*, a stage later *Cecropia* spp. in restinga and cleared land. *Salix* of several ages, up to perhaps 10 m. tall.

Some large areas of flood plain or low restinga dominated by *Muntingia calabura*. In places mixed with other small trees. Form a compact layer about 6-8 m. tall. Here and there are patches of rather tall ~~forest~~ forest of *Calyptophyllum*, *Triplaris* and a number of other species up to 30 m. tall, rather ragged.

Indications in bank tend to have floating grass mats, prominences tend to be eroding rapidly so that trees are down along the bank. *Triplaris* in flower or fruit, white.

Aug. 1 Mayaguez

Cleared now ~~water~~
~~flat~~ plain with low
canals, muddy
with *Utricularia* erecta
on muddy flats - a pasture
well. Terns fishing in
canal.

In old canals

Jussiaea

Pistia

Eichornia

Neptunia oleracea

Aschynomene

Cyrtosperma covers flats

In flats a village
a grove of coconuts,
mature, but mostly
not very productive -
attacked in terminal bud
by *Rhynchospora* sp.

and by a moth larva.

Some trees rather loaded
perhaps look poor because
of using green nuts.

Here Cananga has his
largest canal, cut through
the restinga. The muddy
water flows in at a rate
of between 100 to 200 ft. second.
his said to be because
of the enormous evaporation

from the surface of the lake

Only 70
per cent

The vast wet meadows
grow on a muddy soil that
will not support the weight
of a horse, though it is
traversed by Indian buffalo
of which there are 1600 head
here, feeding in the wet
meadows. Produce a very
rich milk ^{which makes} good cheese.

The lakes which normally
have dark clear water, here
have muddy water as in
the Amazon.

Water very seldom flows
out of the lake, only once in
3 or 4 years, then at driest
season for about 2 weeks
it flows in and out with
tide. Tidal fluctuation 20-25 cm.

The land that is built
up by sedimentation by the
water from these canals is
firm because of the proportion
of silt and fine sand.
When dry will support a
horse or station wagon.

Considerable *Eichornia*
in patches on lake, but not
excessive.

Salix martiana, small tree,
have enlarged bases and
conical, with bushy roots
at top of cone and above.

Large white herons, bottle-nosed terns, a common gannet-like bird, etc. are common. Tern looks like *Thalasseus*, with large yellow bill and habit of bobbing it.

What appear to be boat-tailed grackles common near village. Several species of small shore birds, a hawk, and small thrush-like birds with yellow front parts.

Aug 2. Belterra

The rubber plantations have a ground cover of *Pueraria* sp. The variation in leafiness out is explained by Townsend (geneticist at the plantation) as due to various clones used in top working the trees.

The soil here is dark and has a fair clay content. There is said to be a correlation between areas of dark soil and extensive Indian occupation.

Aug. 2 - Santarem to Belterra
Low hills partly grassy, partly wooded, mostly showing clearings in various stages of revegetation.

Forest becomes more luxuriant toward Belterra grass disappears.

At Belterra are large areas in *hevea*. Different fields are in different conditions. Trees are quite individual in leafiness, from bare to fully leafed out. In some fields many trees appear to be dead, ~~possibly not~~ but are not.

Belterra - 4 months dry season. 90" rainfall, 90 percent of which is in the 3 wet months.

Second growth very thick - conspicuous genera *Pyrissonima*, *Mabea*, *Belubra*, *Vismia*, *Miconia*, *Davila*, *Sabicea*, *Randia*, *Tabernaemontana*, *Liparurus*, *Casuarina*, *Dioscorea*, *Cecropia*, *Attalea*.

Pariana - a *mazonia* only, all in forest.

Aug 1 - Pindobal

Broken-down primary forest
largely palms - *Maximiliana*
etc. at least near
river. *Calycophyllum*,
sp. mecanum, *Cochlospermum*,
many other trees.
Copaifera

Bordo dos Viveiros
ed. of plantation

Broken down primary
forest - tall trees of *Piptadenia*,
Benthollia, *Dabassu*,
many other large trees
up to 40 m., now sparse.
[*Alchornea* (or *Apurimacum*) *crataegus*]
canopy incomplete, because
of several years of selective
logging, now have a thick
under layer 4-6 m. tall of
moss. Trees up to 1 m. diam.
but now these are rare.
Some buttressed, others
fluted.

The soil here on the
"Planalto" is gray-brown
shale clay on the surface,
more yellowish below, very
stiff clay - yellow - almost
ice. Planalto is a
tertiary alluvium.

Letters
refer to
all letters
marked
along
Aug 2
crisis
in WAC
chart.

A

B

C

Aug. 2 trip by air from
Belterra to Belem
(south side of plan)

N.E. of Belterra most of
the Planalto is under
shifting agriculture, some
patches of forest left but
mostly in ravines. The
Planalto here is quite
dissected by steep
walled ravines.
Cycle here must be
fairly long perhaps 5 or more
years, judging by
proportion of fallow land.

Down on lower terrace
there is much shifting
cultivation, too but at least
half the forest remains
except near Santarem.

The Amazon is a braided
stream on a gigantic
scale.

N.W. of Lago Grande is
an area of savanna with
thickly scattered trees and
thin grass. It seems heavily
grazed, in places definitely
overgrazed. In some places
it is open with patches of
trees. Cattle trails cross
the grassy parts everywhere.

D

along the ~~river~~ north margins of Lago Grande are abundant palms growing in the water (at this season). The muddiness of the lake, from the canals, reaches to some extent even to this side.

E

A small range of rather abrupt hills (said to be carboniferous), beyond them some savanna. Scattered hills extend off to the north. In the

F

in the wet grasslands along the north side of Lago Grande are spectacular meanders of old channels. (shown somewhat on map). A few scattered houses on these wet grasslands along these meanders.

G

Along the south bank of the Amazon opposite Ilha Curua are conspicuous light pinkish-yellow low cliffs or bluffs. Scattered houses and clearings along restingas below Ilha Curua on south bank.

H

Between Lago Tamará, Lago Maracá and Rio Purusinho are what appear to be extensive *Montichandia* swamps

I

with scattered trees. Lake at head of Rio Purusinho is irregularly patched with numerous small islands of various sizes. Small patches of dry savanna south of it.

These are either man-made or man-extended as their margins are in places angular and there are scattered houses and buildings.

Many ponds and channels of black water. Many of the ponds have one or even two circular islands in them. They are had 3, one at each end, or 1/3 the way from east end.

J

R. Puni, streams running northward into Rio Purusinho, and Amazon have broad strips of what looks like tidal marsh. A little shifting cultivation on higher ground along or between some of these streams.

There is apparently much water in this area and to east covered by thin vegetation. In places looks almost like glaciated marshy terrain.

This sort of thing very sharply set off from forest on somewhat higher ground. More and more cumulus clouds.

K

Farther east "old channels" become very conspicuous, even at some distance from the Amazon. These are situated in wet grassland or *Montuclandis* swamps. Too high alt. to tell, looks brownish green. Land is minutely flooded out vegetated. This terrain is sharply set off by its brownish-yellowish-green color and entirely different texture from the slightly higher forested land bordering it to the south and on islands in it. The inundated land is extensive and extends dendritically southward into the forested higher ground.

* extends from about along our course north to the Amazon.

L

Along south ~~at~~ edge of this inundated area, farther east ~~is~~ is a belt of palm forest ranging to savanna with hemlock-like islands of dicot forest.

This is just west of Rio Xingu. Boundary is very irregular, width varies from very narrow to quite wide, and dendritic extensions reach up into the forest just as the inundated land did a little

farther west. - all palm strips may have been what I took for swamps about here on the trip from Belém to Santarém. (not entirely but much of it this, eastward)

M

This has been roughly following Rio Jacaré, a tributary of it from the south, west of Rio Xingu ~~is~~ a broad ~~at~~ strip of what is probably wet grassland with much ~~the~~ *Montuclandis* swamp, a few small patches of palms.

East of this stream is slightly elevated, somewhat dissected wooded land with narrow branching fingers of palm forest. By the nature of this pattern these palm forests must mark small stream systems, but the streams cannot be seen.

N

Some grassland with areas of palms on west side of Xingu. parts of this may be rather wet. Does not extend more than a short distance up the river, very little developed on east bank of Xingu. A few old channels, C lakes, etc on east bank, filled with wet grassland, some narrow white sand beach, but broken.

O

P

Small stream running
road, east of Ranger
a narrow strip of wet
grassland. Here at least
no farm south of course.

Q

East of this is what
seems to be an old channel,
running north, rather wide
of white sand with a sparse
scrub (p. 20).

R

East of the Ranger the
dendritic patterns in the
forest are definitely not
palm forest and definitely
do follow stream courses.
appear here to be narrow
flood plains which have
been rejuvenated, have a
meandering ravine in them. The
vegetation on these flood plains
is conspicuously more textured
than in the surrounding forest.
In the surrounding forest are
more bare trees and much
more variation in color of leaves.

R. Casimiro

Baia Casimiro

S

The ~~Rio Casimiro~~ before
before it enters the Rio Casimiro
has a spectacular drowned
ravine pattern, with
the green islands and peninsulas
standing out very sharply
against the black water.

The land here is somewhat
higher than the water so

T

There is no inundation
in the low wooded bluffs
east of and south of
the ~~river~~ ⁱⁿ some slightly
dendritic

U

grasslands, apparently
occupying old stream
courses or narrow flood
plains now left stranded.
Some shifting cultivation
here along south banks
before the narrow
to form the narrow winding
channel called Rio ~~Anapir~~ ^{Anapir}.

V

Some shifting cultivation
along both banks of river.
Here some old dendritic
flood plains are covered
by forest locally largely
of palms.

W

To the north a very
irregular grassland possibly
occupying an ancient flood
plain, quite wide. A few
narrow ones of this sort, in
just north of Rio Anapir.
These can definitely be
stranded flood plains.

X

North and west of Baia
do Patal are some rather
large ~~some~~ grasslands,
no obvious pattern - near
Malgaso. Tapapuni
Estrecho do (Tapapuni) angles

across into the Rio do Para.
 then has ^{maneuver} it as ^{if} ^{it} ^{is} ^{not} ^{clear} and several
 other small villages.

Rio do Para ^{starts as} a series of
 parallel curved channels
 slightly braided.

The main channel or ^{is}
 Estreito do Papim is extremely
 muddy, the others almost as
 much so.

The islands between
 these channels, as well
 as those of Rio Para are
 almost solid forest, a few
 little irregular grass patches,
 numerous shifting ~~these~~
 agriculture patches, mostly
 near the channels.

More small patches of
 grass as we go east,
 north of Rio do Para, a to
 more shifting agriculture and
~~patch~~ irregular patches of
 a different, darker green, sort
 of forest.

Many large channels
 or straits coming south
 from Amazon to Rio do Para,
 all very muddy. Eastward
 along Rio do Para many
 very irregular small savanna
 (photo). Then a very wide area
 where the grassy parts exceed
 the wooded parts, this rather

well away from the Rio do Para,
 north of it. Pattern of forest
 and grass intricate (photo)
 appears to be dry, from
 a parade of the very few
 trails must be sand. Grass
 seems to be rather tall
 scattered bushes and small
 trees in parts. Several parts
 of it have been recently
 burned.

Eastward of this some
 smaller, less intricate
 patches of similar forest
 and considerable
 shifting cultivation. Irregular
 its pattern of this similar
 to that of the savanna patches
 suggests that this may have
 been the origin of the savanna.

Considerable areas of
 the forest east of here are
 of lower stature, much
 finer texture than that
 surrounding it. ~~In the~~
 Almost like a scrub. In this
 are smaller patches that
 are almost savanna. This
 complex may be secondary
 after shifting cultivation, but
 the boundaries are neither
 sharp nor angular.

East of this there is an
 extensive network of channels

of various sizes around islands of various size northward much savanna with a small proportion of forest, but increasing locally. Much shifting cultivation on some of the islands, with houses along channels, also many ~~to~~ bathhouses.

The island area is generally wooded except for clearings, north of the island complex the savanna-wood complex continues eastward, extending.

The forest on the islands has many palms, though not predominantly palms.

Rio do Para has become enormously wide.

The savanna to the north becomes more and more extensive and with less forest, and the island complex disappears eastward. The savannas finally approach the Bay of Rio. Eastward also they have generally many scattered shrubs and small trees.

South bank of Rio do Para a Baía de ~~Marajo~~ Marajo varies between yellowish sand beaches, very low ^{wooded} bluffs,

to occasional stretches of very low bare light colored cliffs.

F Much shifting cultivation in the area west of Belém. In stages of revegetation.

Aug. 4. A. Uribea, 20 km:
~~the north~~ east of ~~Uribea~~ Belém
 Tall rain forest, up to
 22 (450) m. fairly closely
 spaced, trunks tall clear
 for as much as 2-3 m
 up to as much as 1 m. a way
 through without the buttresses,
 many of larger trees
 with conspicuous buttresses
 up to 3-4 m. high and
 1-2 m. wide at base.

commonest tree (acc. Murga)
 (Eucalyptus urophylla)
 odor
 V. - trum sp.
 Gubbia g. and
 other *Chromolaena turbinata*
 1.5 m. diam. listed.

Buttresses - some have buttressed trunks
 of 2 m. or more across,
 large trees 10-20 m. apart
 some 1 m. or more apart
 20 m. apart, a continuous
 layer 0.2 m. tall at base of
 canopy layer.
 but the ~~trunks~~ some ~~climbers~~ climbers are ~~climbers~~ climbers
 few have ~~climbers~~ climbers
climbers.

Soil a gray brown sand
 with ~~abundant~~ abundant
 white fragments of ~~various~~
 sized small boulders.

~~second story~~
 Second story of small
 trees very irregular
 in height, not sharply
 separated from the
 seedling layer or from
 canopy layer.

Protrusion with very
 small leaves, much
 like *Chromolaena* in leaf.

The spacing of trees
 in this forest varies
 considerably locally,
 some large trees seen
 as close as 5 m. apart
 in some numbers.

Small epiphytic
 bryophytes and lichens
 common on trunks, but
 no leaf epiphytes seen.
 Myrmecophilous plants
 common, several kinds.

One can walk freely
 through this forest without
 cutting.

- ✓ Aug. 2 - Belterra, Bordo dos Viveiros, Rio Tapajós in ~~rain forest~~ somewhat disturbed forest on clay soil

38802

occasional

03 Viola

occasional

- 2 04 Pontederia lutea Eyma det. J.M. Pires July 1981
occasional

- ✓ Aug. 3 - Uruboca, northeast of Belém

In edges of rain forest on sandy soil

05 Olyra latifolia
common

06 Hemand Sparattanthelium
common

Aug. 4 - air trip Belém - Santarém
Manaus. (with side of plane)

A few patches of pepper (*Piper nigrum*) in vicinity of Belém.

Baía de Marajó is very muddy, light café au lait color, opposite Belém.

The islands outside of Manaus ~~seem to be~~ are covered by what seems to be undisturbed swamp forest

Letters to
along coast
of W.C. Hart

A

mostly

tree with deeply fluted trunk 50 m. thick; fruit immature.

tree; flowers yellowish.

tree

erect.

shrub 3 m. tall, sterile; branches rather subscandent.

except for some clearing on the ~~large~~ largest. Patches of *Monticordia* occasional among the trees.

- B Savannas in the eastern half of Marajó Island are covered by scattered shrubs & small trees.

- C West of the savannas for a short distance the clearing are mostly immediately along

the streams or channels.

Westward somewhat toward
Rio Canatien and beyond,
they are away from the
channels and scattered
in the interiors of the island
perhaps this reflects the
distribution of "terra firme" vs.
swamps

Westward, perhaps between
Pine and Greer, are more
savannas, in smaller patches
than those in the eastern half
of the island, but amounting
to a large total area. There
have some scattered shrubs
but far less than those in
the east. Just east of the

Two macraea ~~to the Japanese~~ ~~not on the land~~
~~in the mouth~~ are small patches
of a different sort, probably
secondary & pastures being
invaded.

All of the streams and
channels ^{seen} in the Marajo
Island (with one small exception
about in the middle of the south
coast) are extremely muddy
as are the Rio do Pará and the Baía
do Portel.

F West of ~~the~~ Malgases are
some ~~not~~ savanna areas,
mostly not as extreme or as
sharply delimited as are those

on Marayo Island. West from
these are a few ^{smaller} smaller
openings, mostly apparently
along old stream courses.

West of the Barrage de Portel
no farction is seen, the
streams are all clear or
black water, no mud noticed

On some of these around the
Lower Baño de Capim are
large numbers of *Sacharococcus* regis.
Baño de Capim is black ~~water~~
or clear water.

There must be very numerous
of them, as well as a good part
of the time.

H On road side, of these delusions
are scattered houses along
the shore and clearings back
from them, many of them being
overgrown. One conspicuous
savanna apparently occupies
~~a former~~ the bed of a former
arm of the bay, south of the
two lagoons, with some water
in center.

J. West of her no more shifting
altering & cleanings or removal
seen

Many trees in flower on the
canopies of the forest

K) Several streams east of Rio
Banco Lengua lined with belts of
dry savanna.

L Large savannas west of
lower Xingu around Paraiso.
These extending westward into
extensive forests of palms forming
a dendritic pattern far into
the main rain-forest, which
is very dense and continuous
here. ~~unbroken~~ westward to the
wet savannas bordering the Rio
Purusinho.

M Cecropia very abundant.

N Victoria regia abundant in
streams ponds, etc. south of
Rio Purusinho.

O Patterns of flooded land
and patches of dry savanna and
forest ~~along~~ ^{south of} this river are very
intricate, not easy to interpret
from air.

P Broad belt of wet savanna
and flooded land south of
Amazon ^{well} east of Santarem.
Extensions of this into forest
with abundant palms.

Victoria regia in water, locally ^{very} abundant.

Parts of the wet savanna
have a brown color. Victoria
regia a light "dusky" green.
~~Green~~ Areas of coarse grass
rooted or floating, bright
light green. Montischaria
swamp (?) dull green.

Q Dry savanna, north west
of Lago Grande has abundant

scattered bushes and
small trees in most
parts. Has been in parts
~~the~~ ^{very} overgrazed so
much red and white
sand shows. Western
part is especially this way.
A road traverses the western
part (or two roads), mostly
no wheel tracks visible
from air. Some small
areas have been burned
rather recently.

R Back of Santarem the forest
is sparse on flat areas and
much overgrazed, cleared on
hills except some that are
cleared. Bare ground shows
with cattle trail, south
of the airport. Much of
this sort of ~~open~~ scrubby
woodland between Santarem
and Belterra. Some is really
savanna with abundant
trees.

S On the Rio Tapajós is what
appears to be a bloom of algae,
locally concentrated by wind
so as to be visible from the air.

T Across from Santarem on
the peninsula between Rio
Tapajós and R. Arapiuns, between
São Francisco and Boa Vista
are large savannas with few

trees. In the middle of one of these a fire was burning, already having blackened a substantial area. Scares of older ones also seen.

Many sand beaches and spits around lower Amazon. Fertility becomes poor because of bays.

Old stream courses show up in place as sandy stretches with open scrub. Usually a strip of differentiated vegetation bordering these and connecting different patches along same old stream-course. Just east of Iauantins.

West of Iauantins is a vast area of land, mostly flooded at high water, with only the vestiges of a natural levee remaining dry. It is a complex of meanders, old channels, levees, wet grassland, ponds, lakes, swamps, etc. large sheets of water with numerous small islands, even single trees growing in water. The place has the appearance of a labyrinth of channels.

W of Ressaça a large meander cuts off abruptly a series of parallel channels and bars.

West of this east of Faxanacari is another labyrinth of levees, channels, islands, etc. and the whole area immediately surrounding this lake is unbelievably complex, a browned shore-line of wet savanna, black water ponds and swales, patches of swamp forest, and levees and channels.

West of it the terrain changes first to predominantly *Monticordia* swamp (?). Then a forest much interfigured. North from Tacotiana is a very conspicuous road cut thru the forest - brown up bright red.

The joint-crack structure described by Sternberg begins to show up well here, stream intersections and turns ~~usually~~ mostly forming right angles.

Even when the streams cannot be seen, their courses are marked by strips of lighter green finer textured vegetation in the dark green of the forest. Forest otherwise rather uniform except for rare patches of very large pale green trees that show up against the dark green background.

C The ~~point~~ Rio Urubu, below
 São Raimundo is a striking
 drowned system showing the
 joint-crack structure rather
 well. This is, of course,
 up on the tertiary terrace
 rather than on the flood plain.

D Another drowned system,
 much more complex than shown
 on the map, on stream above
 Casa Casimiro, east of Manaus.

E West of here a few small
 savannas, apparently with
 white sand, probably ~~due~~
~~to~~ resulting from clearing and
 burning.

Aug. 4 - Santarém Est. do Pa...
 In cleared sandy ground
 around airport.

- 39807 *Cassia*
 common
- 2 08 *Turnera*
 rare
- 2 09 *Cassia*
 common
- 1 10 *Fimbristylis*
 occasional
- 2 11 *Boueria*
 occasional; frequented by fire ants (Holoptes)
- 2 12 *Cassia*
 dominant over much of area
- 1 13 *Turnera*
 common

Aug. 4 - Manaus

cultivated plants noted:

Ficus retusa (common tree)

Mangifera indica

Alocasia macrorrhiza

Philum sabbatilla

Polyscias guilfoylei

Drucaena sp. (leafy for some distance)

Indyllum terminale

Cyperus alternifolius

Polyscias fruticosa

Dieffenbachia maculata

Lagerstroemia indica

Alocasia (large pinnately lobed lvs.)

suffrutescent herb to 2.5 m. tall

low bushy suffrutescent
 herb, flowers yellow.

low spreading shrub

caespitose in small tufts.

spreading somewhat elongate
 herb, flowers very pale lavender.
 stiff shrub 0.7 m. tall; flowers
 bright orange-yellow.

flowers very pale blue.

Aug 5 - air trip, Manaus - Toffe
(north side of Amazon)
6,700 m. Panimula. Between
Rio Negro and R. Solimões densely
wooded. Slightly dissected.
Winds of mist lying in low
spots, vanishing rapidly.
Apparently this is part of
the Tertiary terrace. Several
farms and shifting agriculture
along west bank of lowest
~~Amazon~~ s.s. bank tributary
of Rio Negro. This group of
tributaries makes a rather
intricate drowned system
that shows the joint crack
pattern very well.

Then a thin layer of very
low clouds or fog made visibility
poor for a short distance. Then
this thinned out until it
lay only in the shallow
ravine. Bringing out very
well a roughly rectangular
pattern - not quite rectangular,
about 80/100'. Entire area is
densely wooded. The drowned
river system emptying at
Manacapuru shows this
also, but not clearly. It is
very intricate, the dissection
here being much finer
than to the east.

Just west of this is solid

not so dense
on west side
A. 5/5

B

very low cloud layer.

Opening in clouds at which
is probably ~~Lago Anaman~~
the northern extension
of the south branch of the
drowned drainage system
(perhaps Lago Anaman).
C
7. m. It has a conspicuous
settlement on the north bank with
clearings.

D One small clearing noted
to west of western arm of
the system. This system is
also very intricate, especially
just east of the settlement.
Still a more or less rectangular
pattern, but not too clear.

E Small lake east of Lago
Anaman also a drowned
system but not much more
intricate than indicated on
the maps. I suspect, judging
from its position ~~and~~ in rela-
tion to Lago Anaman that one
or the other is wrongly placed
on the maps. Lago Anaman too
far north or the other too far
south. Anaman also no more
intricate than on the maps. Both
show angular structure
very well. Fourth end of

F
G east part of Lago Anaman
has cleared banks, several
houses, other grassy clearing,
nearby.

H Another smaller drowned system with considerable grassy clearing around it south of main body of Lake Anaman, west of south end of east arm. These clearings are mostly very green.

Low cumulus and stratocumulus too thick westward, for good visibility.

716 Series of ponds surrounded by grass, ~~could be the~~ ^{extending north a short way}

I ~~Across inlet~~ ^{Pholimaes} visible on left of plane. Otherwise all is densely wooded.

Low layers of thin wispy clouds not enough to obscure visibility completely.

J Upper end of Anari inlet also has considerable clearing.

Clouds thicker westward.

K 718 Considerable cleared area but not very visible because of construction of plane - mostly beneath. To north densely wooded.

L Long inlet ~~west~~ ^{west} of Codajay shows striking angular pattern. Visible only in distance.

M Below mouth of this inlet the Tertiary terrace apparently comes right to the bank

N of the Solimaes. At least there are low bluffs. At mouth of inlet there is a narrow flood plain island. Passed mouth of inlet at 7:40. Big loop of main channel of river encloses 2 large islands with typical pattern of channels, levees, lakes, ponds, etc. River is very muddy. Much less wet savanna and floating vegetation and more forest here than on similar islands below Manaus. Visibility rather poor but possibly some shifting cultivation here.

A thick layer of cumulus below and nimbus or stratus above, and rain on the window obscured visibility.

720 P & Glimpse of two fair sized lakes & channels north of the river with what appear to be fair areas of wet grassland.

Q & Islands across from Camano have some wet grassland in interior in patches, mostly forested. Some of this may be floating vegetation on the lake margins.

R At least one house and ^{small} clearing on south shore of upper island.

S The island west of Camara has dense forest but the lakes are bordered by grass, possibly partly floating.

T Above this island the north bank is densely forested. Visibility very poor.

804 u Large lakes north of river.

#V Slightly higher ground with scattered houses and clearings between lakes and river. This apparently just west of 63°.

Clearings have tall straight trees with umbrella like ~~crowns~~ crowns left scattered in them.

W The forest on the island south is rather uneven but largely of trees of this habit.

814 Landed on water at a sizeable town on low bluffs of red soil, perhaps 10 m. high. ~~Coan~~ A rather bare town, few trees except a clump of two of coconuts, one or two other rather large trees - mangos - ~~perhaps~~.

West of Coan where river turns north the bank is high and red.

Some clearings along the west bank of the river to the west.

815 A The cross from here rather recent, visibility obscured by rain. Island across from 7 of also appears apparently all wooded except narrow cleared strip with scattered house, at least one new clearing inland.

West of this on the south side as nearly as can be made out through holes in the clouds, all is tall dense forest.

816 C Wait on the north bank in some grass, but too obscure to see if it is clearing or wet grassland.

Clouds are very thick. We are following river. Raining.

Many lakes and ponds visible to north, but no details. Some of the closer ones have some grass around them, probably wet grassland. Some flooded land with trees. Lakes become isolated westward, with less grass. Then more numerous. Over a few areas of low scrub, possibly on slightly higher ground, no patch like a low elongate ridge.

850

D

Westward rather uneven forest, some patches finer textured and lower. In taller forest quite a few leafless

a just leafing out emergent trees. A few scattered tall bright yellow ones in full flower.

Then a large area of lighter color, more or less bright - possibly swamp forest or inundated forest. Seems sharply set off from darker, green forest to north, possibly by a low escarpment. A small black water pond in the middle of this lighter forest. Westward this interfingers with taller forest - the difference is considerable.

Then mostly tall forest, again with the yellow flowering trees. Then a meandering narrow meandering channel and some cut off meander, some wet grassland, perhaps floating. Several new clearings on north banks of this. ~~Scattered~~ ~~then~~ some patches of low dense forest, almost scrub, lighter dull green. Tall forest mottled with trees in various stages of leafing out. Some red - possibly in flower.

9.03

E

then many channels in confused arrangement, much

with grassland, some inundated and with small trees.

Then rather irregular tall forest. A few leafing, possibly grass-land. Also some that are clearly wet grassland. Scattered ponds.

Westward more ponds surrounded by a scrub vegetation. Patches of this scrub may mark location of former ponds. This pattern of ponds, scrub and forest more marked westward. Boundaries between scrub and forest become sharp.

The scrub seems to be in water. Still farther west the scrub becomes more of a wet savanna with scattered ~~tall~~ bar trees and low bushes or partly grass.

F 2.11 Then we cross the Holimbes which is wide here.

G

Small islands ~~east~~ south east of Tefe have wet scrub in interior, forest on periphery, narrow or wide. A few houses on banks. Some patches of wet grassland on east end of Jiba Panenim, some filled or partly filled cross channels running southeast. Areas of wet savanna in interior. Some ponds and wet grassland.

H

Swamp forest around Lago Tepe very mottled with trees in all stages of leafing out.

Tepe is a substantial town. ~~Some pale tan beaches with clearings~~ ~~around~~ ~~shores of Lago Tepe~~

Left Tepe about 10 a south along lake, then at considerable altitude out over forest. Cumulative clouds make poor visibility, but forest seems uninterrupted.

I Thus for 35 minutes, then a small exceedingly meandering river at right angles to course.

Find a single meander of our farther ahead, to right, then one broad in places, possibly in former meanders, a large very muddy reddish river - contains a few dense forest except possibly ~~some~~ a few clearings along river. ~~Some~~ some cut off side meanders or or low lakes or perhaps other channels, as they are rather muddy. Then a lake, ~~probably of the same~~.

J 1057

Then a large muddy elbow then no not muddy and with grass along the edges. The river has narrow bare mud banks

L 1058

crossed 2 rivers

A few narrow winding very muddy tributaries or channels in forest and a large muddy elbow.

Thames and or bow mostly muddy in dense forest a long the north ~~side~~ side of Rio Jurubá toward ~~eastern~~ Camuani.

11-16

Local areas of dense lower scrubby forest or swamp - not frequent.

11-22

M

to few small ~~statues~~ clearings. Show a little relief and reddish soil. Travelling at lower altitude.

Forest quite mixed, many trees leafless or leafing out, & closely mottled appearance. Much shifting cultivation locally as we approach ~~Camuani~~ at a fairly low altitude.

Landed on Rio Jurubá. Sandy banks about 6-8 m. high, forest almost down to banks, a narrow strip of grass at top of bank. The forest looks rather

some palms not

scrubby, probably secondary but hard to tell. Very dense, about 10 m tall.

The sand must have some clay as the cut banks in places stand up ~~rather~~ almost vertically, seems to be an irregularly bedded fine pinkish tan colored alluvium. Large sand bar on north bank River 100-150 m. wide.

Take off 11-22

Considerable shifting agriculture locally near ~~Camuani~~ Camuani.

215
C large muddy meandering river
with clearings (a savanna)
on west side some extending
or occurring some distance from bank.
Otherwise forest. Some or bow lakes and
traces of old channels.

Then gaining altitude, a slight
haze cut visibility to nearly zero.
Scattered cumulus clouds.

2
D A large area that looks
like savanna swept of
an extremely meandering muddy
river with many and confluent
can not see it well but it is
sharply demarcated from the forest.

E 2
I had one small channel
lined for a way with grassy clearing.
Following now with meandering
river on the right at some distance.
Still many or bows, some very
muddy, some not. Some are
choked with vegetation.

F 215
I had large groups of clearings on west
side of river. On bows now mostly
not muddy.

G 2
A few small clearings, otherwise
the meandering river with its bows
in the midst of a tremendous forest.
No meanders have sand bars
on the inner sides where there are
close enough to be seen that well.

H 211
Large cumulus clouds rather abundant.
Left the river, but to the right, still
visible.

212
I meandering river again at a lower
altitude. Meanders very
pronounced, ~~some~~ with pink
sand bars on the inner side
on outer bank is practically
circular filled in one end
with low woods, the other
with grass. The belows here
not muddy.

310 Several clearings along river.

311 Clearings and some signs
of old ones away from the
river, then more and more
cleared land and at an lower
cleared land. The whole
area has been cleared
except small ravines and
steep places. An area some
miles across, at least north
of the river. Cruzeiro do Sul
town is on irregular high
ground, perhaps 30 m. above the
river.

Active clearing going on
around the airport are thickets
and much tall herbaceous
cover - this of *Pteridium*, *Urena*,
a gigantic form of *Peltandra*,
something similar, and several
tall grasses - *Paspalum*, an *Andropogon*,
what looks like a *Panicum*,
and the smell of *Melaleuca* is
very strong but none seen.
The belows growth is 1-2 m. tall.

198

199

19 200



